

## *Comparison of Moodle and ATutor LMSs*

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**Abstract.** E-learning is a technology that plays an important role in modern education and training. Its great importance lies in the fact that it makes learning content readily available at any place at any time. This paper examines and evaluates two of current systems Moodle and ATutor. The main aim of this paper is to identify the aspects of these LMS systems, examine their functional features, modules, standards, hardware and software requirements, and compare them.

**Keywords.** e-learning, education, LMS, Moodle, ATutor

### *Introduction*

Online courses are moving into the mainstream and the software commonly used to deliver online courses can be prohibitively expensive. Classes take place online through the use of software packages that have special classroom features, such as discussion forums calendars, chat rooms, where participants can communicate in real time with each other, and quiz and polling capabilities. Files such as word processing documents, sound files, pictures, and videos can be uploaded to the virtual classroom for viewing by students. Thus, the "platform" is essentially a place that looks like a private website and is intended to work like an electronic classroom. The classes taught on these platforms are accessible via the Internet, and are usually private, meaning that only individuals who are registered for the class can see the password-protected website. A platform for online courses may also be called an LMS (Learning Management System) or LCMS (Learning Content Management System).

The NODES project aims at promoting the use, in adult training, of multimedia knowledge, in order to facilitate competitiveness, employability and mobility of adults who are victims of the digital divide or of some of its components such as distance, initial level of knowledge, language, use of complex technologies, etc.

Our task in the project is studying the existing free or commercial licences e-learning software. The aim of the investigation of these systems is surveying the most important functional features, modules, standards, and hardware and software requirements.

After the comparison of the e-Learning systems by several methods, have to evaluate the most important parameters, which are suitable suggestion for the project management. These parameters were evaluated.

Reviewing these parameters, our suggestion is the Moodle or the aTutor

This paper examines and evaluate these suggested Learning Management Systems, Moodle and ATutor, their functional features, modules, standards, hardware and software requirements.



ATutor is a promising system that provides good documentation, ease of installation, and strong potential for development. While the user interface may not seem intuitive to many, the overall functionality is good (and wide open/modular) and the development team is committed to standards. The system is also install-friendly and receptive to new language versions.

ATutor is one of very few LMSs that support learning object repositories. ATutor is very

strong on standards and can import external content in IMS/SCORM format.

ATutor scores highly for openness. It is written in a modular format. It has many features and rates highly for usability, including accessibility for learners with disabilities.



Moodle is a software package for producing internet-based courses and web sites. It is an ongoing development project designed to support a social constructionist framework of education.

Moodle is provided freely as Open Source software (under the GNU Public License). Basically this means Moodle is copyrighted, but that you have additional freedoms. You are allowed to copy, use and modify Moodle provided that you agree: to provide the source to others; to not modify or remove the original license, and apply this same license to any derivative work. Moodle will run on any computer that can run PHP, and can support many types of database

The word Moodle was originally an acronym for Modular Object-Oriented Dynamic Learning Environment, which is mostly useful to programmers and education theorists. It's also a verb that describes the process of lazily meandering through something, doing things as it occurs to you to do them, an enjoyable tinkering that often leads to insight and creativity. As such it applies both to the way Moodle was developed, and to the way a student or teacher might approach studying or teaching an online course.

Both of these learning management systems are written with PHP and MySQL and are based on the open source (GPL) licence agreement. Several other systems have been investigated during the lifetime of this project, some using different technology including Java Server Pages, Java Applets, and DHTML. However, it was felt that the infrastructure behind the newly installed LMS should compliment that of the current Client Management System (CMT).

## ***Evaluating aspects***

### Technical flexibility

- Hardware and software requirements
- Support
- Cost/License
- Authentication

### Learning tools

- Forums
- Materials
- Messenger
- Chat
- Exercises
- Group work
- Student tracking

### Usability

- Technical knowledge/installation
- Course templates

- Standards
- Languages

## ***Technical flexibility***

### **Hardware and software requirements**

Both softwares support any browser although Internet Explorer 4+, Netscape 6+, and Opera 5+ are recommended.

The systems requires a My SQL database. ATutor supports PostgreSQL databases too. The systems requires only one database and can coexist with tables from other applications.

The softwares require PHP, MySQL and web server software such as Apache or Microsoft IIS.

Both softwares are available for most versions of Linux, Unix and Windows.

### **Support**

ATutor is an open source project from the Adaptive Technology Resource Centre (ATRC) at the University of Toronto. It currently collaborates with other Canadian institutions. The 1.0 version came out in December 2002. The ATutor web site includes a support forum, a forum on bugs and another for the proposal of new features.

Moodle.org is an open source community launched in 2001 that has grown out of a PhD research project by Martin Dougiamas, on the technical staff of Curtin University of Technology (Australia) with experience in WebCT and in academic training in the fields of IT and education. Version 1.0 was released on August 20, 2002. Moodle.com is a company launched in 2003 that sponsors Moodle development and provides commercial support, hosting, custom development, and consulting. The Moodle Partners are a network of companies that work with Moodle.com to provide services around the world.

### **Cost/License**

Both systems discussed in this document are released under the GNU General Public License, which means that the initial package can be freely downloaded, installed, and distributed without charge.

### **Authentication**

In ATutor administrators and instructors can set courses to be publicly accessible, or can protect access to individual courses with a username and password. System has a password reminder option. User logins can be encrypted with SSL.

Moodle uses basic username and password authentication. The system can authenticate against a variety of sources, including external databases, LDAP directory servers, IMAP, POP3, secure NNTP and First Class servers, and Unix users through PAM. The system also supports Shibboleth and the Central Authentication Service (CAS).

## ***Learning tools***

### **Forums**

Discussions can be viewed by thread in ATutor. Posts can include URLs, and can be either plain text or formatted text. Discussion threads are expandable and collapsible to view a list of topics or view an entire conversation on one screen. Threads can be sorted by author, topic, post date, and activity level. Students can enable or disable notification of new posts sent to their email. Threads can be locked by the instructor from reading and/or writing, or attached

to the top of a thread list so important threads appear first. Active threads appear near the top of the thread list. An administrator can share discussions across courses, departments, or any institutional unit.

In Moodle, the discussion tool supports a social constructionist pedagogy model. Discussions can be viewed by date, by thread, by author. Instructors can split discussion branches from the main discussion into a new discussion. Instructors can determine the level of involvement (read, write, or post anonymously) for students. Posts can include attachments, an image or URL. The discussion tool includes a formatting text editor. Posts may be peer reviewed by other students. Students may receive posts to the discussion forums as daily digests of subject lines or whole posts as email. Students can subscribe to forum RSS feeds.

### **Materials**

In both systems, student and instructors can upload files in most document formats to a shared course library, or to a shared group library. Students can share content from their personal folder with other students, and with an instructor or teaching assistants. Students can submit assignments into a drop box.

### **Messenger**

Students can use the internal email feature or instant messaging tool to communicate with other enrolled students in ATutor.

There is no internal messenger in Moodle. Users must have an external email address. The teacher can register students in a forum in such a way that they receive messages by email.

### **Chat**

Each course has an active chat room. The teacher can activate and disable the chat transcriptions. Transcriptions are archived and are available to the students.

There is a PHP-based chat tool in ATutor for course or group level messaging. Students can see who else is online within their course, or group. Instructors may monitor chats. The system creates archive logs for all chat rooms. Instructors can schedule chats using the groups calendar. The chat tool supports multiple simultaneous group discussions.

The chat tool supports images in Moodle. The system creates archive logs for all chat rooms. Instructors can view chat logs and share these with students. Instructors can schedule chats using the course calendar. Students can see who else is online within their course and send them an instant message.

### **Exercises**

Instructors can create timed or un-timed self-assessments that students can take multiple times. The system automatically scores multiple choice, true/false, and short answer type questions and can display instructor-created feedback, explanations and links to relevant course material.

Instructors can create automatically scored true/false and multiple choice questions, and randomize questions from a larger pool, with optional required questions that appear on all randomized tests.

In Atutor instructors can set dates and times during which students can access tests. Instructors can provide individual feedback, override automated scoring, and create individual, unit specific, or course level tests. Instructors can also create survey questions. The system provides test analysis data for individual test items, for individual tests, and for surveys. Instructors can differentially weight tests.

In Moodle questions can contain images, video, other media files, and detailed feedback on

each answer. Instructors can create mathematical equations. Custom question types can also be defined. Instructors can create personal, course specific or system wide test banks from questions can be chosen to create tests for students. Instructors can import questions from existing test banks. The system can randomize the questions in a test and the alternatives for multiple choice questions. Instructors can require a special password and set times for when students can or must access tests. Instructors can set a time limit on a test. Instructors can limit attempts to specific IP addresses. Instructors can differentially weight tests and create grading rules. Instructors can permit multiple attempts, and whether correct results are shown. Instructors can override the automated scoring. Instructors can also create survey questions. The system provides test analysis data for individual test items. The system also supports the Remote Quiz Protocol which allows questions to be rendered and scored externally to the system via standards-based web services.

### **Group work**

Group functionality is available through the ACollab addon for ATutor. Instructors can create group activities, and assign group leaders to create and manage groups. Each group has its own group home page, file exchange area, discussion forum, chat room, group email list, assessments and shared calendar. Students can collaboratively author a document using a version control tool, and can annotate their edits.

Instructors can assign students to groups or the system can randomly create groups. Groups can either be defined at the course level and apply across all activities that support them, or at the individual activity level. In addition, the system supports a workshop module aimed specifically at peer review of student work.

### **Student tracking**

Instructors can get reports showing the number of times, time, date, frequency and IP address of each student who accessed course content, discussion forums, course assessments, and assignments. Instructors can get a report that shows number of attempts and time per attempt on each assessment for individual students. Instructors can maintain private notes about each student in a secure area. Instructors can get a report that summarizes individual student performance on assignments. Instructors can set a flag on individual course components to track the frequency with which students access those components. Instructors can monitor students who are currently logged in to the course. Instructors can summarize all discussion posts to date by a student.

### ***Usability***

#### **Technical knowledge/installation**

Familiarity with web working environments: editing formula, sending files, forums, etc. The teaching staff needs to learn how to create course materials by using the the modular conception of the environment enables the teacher to use it to a greater or lesser degree of complexity: to begin, for example, it is sufficient to learn how to upload files and create a forum

Installing Moodle was relatively simple. It required the source files to be downloaded from the Moodle website, and then decompressed onto the local hard disk. Once it was successfully saved, the required files were transferred to the web server and then the settings were changed in the configuration files to match our settings at Progress through Training. The installation of Moodle was aided by several automated pages, which speeded up the installation process.

Installation guidelines (taken from the installation package):

- Move the Moodle files into your web directory.



- Create an empty directory somewhere to store uploaded files (NOT accessible via the web). This directory must be writeable by the web server process.
- Create a single database for Moodle to store all its tables in (or choose an existing database).
- Copy the file config-dist.php to config.php, and edit it with all your own settings.
- Visit your new home page with a web browser. Moodle will lead you through the rest of the set-up, creating an admin account and so on.

ATutor was originally developed as an open-source VLE from Toronto University in Canada, but has expanded to encompass several Universities across the world.

ATutor was the easiest to install. Once the files had been downloaded, decompressed and placed in the appropriate file on the web server, it was simply a case of navigating to the admin screen and running through the installation screens via an Internet browser.

### **Course templates**

ATutor provides support for template-based content creation. Course content may be uploaded to a file manager, imported from, or exported to, a learning object repository, imported directly from the Web using a URL, or imported from an HTML editor. Instructors can clone and modify the default the templates, or create new templates. Instructors can add to, or remove course functions from course templates.

Moodle provides three default course templates: activities arranged by week, activities arranged by topic, or a discussion-focussed social format. Instructors can create new course or content templates. Instructors can use templates to create discussion forums, links, course content, and resources, and these templates include a WYSIWYG content editor with spell-checking.

### **Standards**

ATutor supports the creation, importing and exporting of IMS 1.1.3 and SCORM 1.2 conformant content packages. The software has self-tested compliance with SCORM 1.2 Runtime Environment Specification. The system includes tools to facilitate the migration of course content between different versions of the software, and to facilitate migration to, or from, other compliant learning management systems.

Moodle can import course content that is SCORM 1.2 or AICC compliant, and can export quiz content in IMS QTI 2.0 format. The system includes tools to facilitate the migration of course content between different versions of the software. The provider company supports migration from the following course management systems: BlackBoard.

### **Languages**

Translation can be done by means of web formula. The language packs are different for each new version of the software. Packs corresponding to previous versions appear to continue working, but the new chains that have still not been translated are substituted by a variable name. The administrator establishes a default language for the whole environment. Each user can select the language of his or her choice for the interface.

In ATutor administrators can download and import system languages, and create new language packs on the product web site. There are currently more than 25 language packs available.

In Moodle 73 language translations are available as plug-in packs.

## ***Comparison***

As can be seen from the evaluations made above for both of the systems there are various benefits incurred when selecting any one LMS over another. Both of the systems examined in this paper are fully compatible with the current Shareable Content Object Reference Model (SCORM) standards for sharing content between different LMSs.

Additionally, both of the systems mentioned this paper use XML metadata to describe e-learning content within the systems.

Yet, without the encumbering technical elements of the SCORM the authoring process for new courses is much simplified. Creating a new course can be as simple as designing several different ‘pages’ (Moodle, ATutor) of content, and then organising them so that they flow in a logical manner.

In addition to these ‘course slides’ consultants can then assign specific resources to accompany each slide. In Moodle and ATutor there would not be a requirement for HTML knowledge when authoring content,.

The collaborative features included in the learning environments vary in both complexity and usability. ATutor is the only system to feature an internal ‘e-mail’ system to allow course users to intercommunicate. I believe that this is a very useful feature to have within a LMS, as it promotes collaboration between users. Additionally, each system requires a valid e-mail address to be collected from each user so communication via external e-mail systems would be entirely possible.

On an authoring note, we found that Moodle’s interface for creating course content was the most intuitive, and featured a very simple to use What You See Is What You Get (WYSIWYG) editor. The use of this editor would remove the need for the consultants to learn any Internet display languages such as Hyper Text Mark-Up Language (HTML), which would significantly reduce the development time required to start creating course content.

## ***Conclusion***

The final conclusion of this paper calls for a nomination for the most suitable LMS for NODES Project’s needs. It is this authors’ recommendation that ATutor be selected as the LMS to implement. Out of two systems, we feel that ATutor has the best blend of sophistication, usability, and range of similar features to those found on commercial learning management systems.

On an administrative note, ATutor was very easy to install, configure and run. The layout of the control panel was very intuitive, and the additional help provided by the demonstration course was very useful before I created my first test course within the system. Out of two systems, ATutor easily featured the most tools.

As mentioned above, ATutor comes complete with its own editor window for creating course content, notes and announcements. Furthermore, it offers the designer flexibility in deciding whether they will enter information in plain text, or attempt to code their own HTML.

In summary, Moodle and ATutor are the best if you have the support you need to set up and run the platforms on your own or a remote server.

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## *Appendix*

**IMS:** The Internet Multimedia Subsystem (IMS) is a standard for negotiating connections intended to carry multimedia content over IP (Internet Protocol) networks. The simplicity of this definition belays both the complexity of the standard and the impact its adoption will have on the telecommunications industry and beyond. By providing a standard communications infrastructure based on the ubiquitous IP transport layer, IMS offers the opportunity to converge voice and data services, as well as video calling and even television.

**SCORM:** Sharable Content Object Reference Model (SCORM) is a collection of standards and specifications for web-based e-learning. It defines communications between client side content and a host system called the run-time environment (commonly a function of a learning management system).

**AICC:** The Aviation Industry CBT (Computer-Based Training) Committee (AICC) is an international association of technology-based training professionals, which based in 1988. The AICC develops guidelines for the aviation industry in the development, delivery, and evaluation of CBT and related training technologies. This standard is based on the HTTP protocol, thereby, enabling student interaction through a standard Web browser.

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