Moodle Based LMS and Open Source Software (OSS) Efficiency in e-Learning

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Abstract - **This paper describes the designing and real time implementation of web based Learning Management Systems (LMSs) based on Moodle open source. We are giving attention to Moodle based LMS system implementation in our college because of its fast growing presence and worldwide community of professionals and educators are passionate on promoting free software and improving the online learning experience to support it.**

It explores open source software's as a symbol for e-learning. It builds the case that e-learning and open source society is embedded in the constructivist. It is suggested that the use of open source as metaphor for e-learning be further explored in three areas: instructional training, instructional podium, and instructional beliefs.

Keywords - Open Source Software, E-Learning, Metaphor, Learning Object, LMS

I. INTRODUCTION

The Open Source community-based software progress model provides industry, government, and academia with significant chances to influence IT investments and boost managerial efficiency and effectiveness by implementing repetitively improving high feature Open Source software. The Open Source community ecosystem provides important software, services and assist apparatus that cross virtually all business-related markets as well as governmental and educational domains. While Linux, Apache, and Send Mail are well known examples of Open Source software, these results make up only a very small portion of the Open Source software available. Open Source software solutions survive for almost all types of business applications. Open Source solutions integrating these and other business functions into powerful applications like ERP and additionally, Open Source software's survive for a variety of vertical markets and is being widely used. These results, as well as many more, are obtainable at different levels of functionality, constancy, commercial and non- commercial maintain. There are the rewards to accept the Open Source software's. [1]

Open Source Initiative (OSI) is a non-profit corporation dedicated in managing and promoting the Open Source Definition for the excellent of the society, particularly throughout the OSI Certified Open Source Software documentation and programs. [2] The usage of eLearning methods and tools is reaching more and more important at universities. This is also the reason for their rapid growth and changed the situation today. Students are in demand of high quality and efficiency in teaching. One instance is the federal storage of documents and resources for courses, another one is the demand for nonstop self-assessments to control the personal learning growth.

Furthermore the usage of collaboration and communication tools like forums, chats, virtual classrooms, file exchange, online survey/evaluations, quizzes and workshops are the other important factor. Another major development is the establishment of the Bologna Process in the European Union. The restructuring of existing programs of study to Bachelor and Master Degrees and even PhDs have often caused a remarkable raise in exams per semester. To solve these kinds of problems more and more online tests are used to reduce the pressure of examiner significantly.

The points mentioned above provide good opinion to integrate eLearning supported by a Learning Management System (LMS) in academic everyday life. We have extensive knowledge with these current eLearning topics, as a major part of our work in the last years in the Prinsems Educator Gateway project concerned the establishment of the central commercial LMS in Prince Sultan College for Emergency Medical Services. In the way of this still ongoing project and it has become more and more obvious as by taking continuous feedback from the students in the college. We designed revolutionary new approaches to solve these shortcomings. One major worry was the design of a system-architecture to permit for an easier integration inside existing campus systems and applications. [3]

For the success of this LMS, it was really important that it is integrated with other campus applications. In our experience, the use of a central LMS is only satisfactory for lecturers if data which was formerly entered in other systems is also available in the LMS automatically. Furthermore actions started in one system have to influence others as well. Everything else is not understandable and satisfactory from a user's point of view and hinders the introduction of eLearning at college especially the swap of data between an LMS and Campus Management Systems is important. As eLearning is becoming an important part, it is obvious that it uses almost the same basic data as previous applications with little domain-specific variations and extensions. This contain among others:

- Personal data about students, lecturers and employees.
- assessment data
- Information regarding the curriculum and program of study scholar grades.

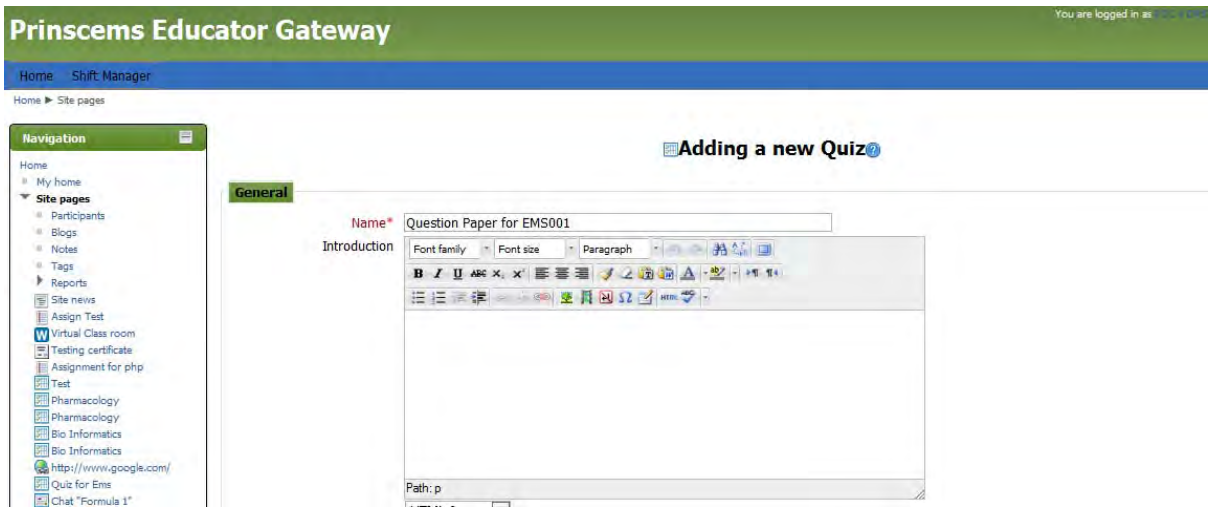

Figure 1-Showing about creating online test.

Not only the basic data is nearly equal, but also a set of actions are joint between an LMS and Campus Management System. Examples as shown in figure 1 include the initiation of course booking or adding a grade to a student's record after taking an online exam and figure 1 also shows how eTest have been created for the students.[4]

II. OSS OVERVIEW, DESIGN AND IMPLEMENTATION OF PRINSEMS EDUCATOR GATEWAY

This paper gives an overview about the current state of integration and implementation of LMS based on Moodle open source software system in Prince Sultan College for Emergency Medical Services. This Educator gateway has been implemented in the college to take the best output from the students and to avoid the instructors from workload. It is clear that a strong requirement for integration and swap of information between students and instructors.

For that three dissimilar approaches and projects are discussed. After that struggle are highlighted and talked about. The last section presents a modern system-architecture and integration infrastructure based on a Service Oriented Architecture (SOA) which can help to create more stretchy integration and system coupling solutions.

A. What are Open Source Software and their importance?

Any discussion about Moodle based LMS should begin with a brief introduction to open source software (OSS) and the OSS community. OSS is a combined name for software code that is available without any cost and distributed. In compare to proprietary or commercial software, anyone may copy, amend, and share open source code without paying fees or royalties. The software often evolves throughout community development, contribution, and cooperation.

The Open Source idea (OSI) (http://www.opensource.org/), a non-profit firm, requires that the sharing terms for open source software must, among other things:

- Allow free redistribution of source code
- Permit derived works
- Certify integrity of the author's code
- Not distinguish against persons, groups, or fields of endeavour
- Distribute licenses

B. The expansion of open source software and its benefits

Over the past few years, OSS has risen from darkness, and has mainly overcome early criticism and doubt. It now enjoys passionate support and implementation by organizations around the world. Besides with these changes, attitudes are also speedily shifting about the use of open source learning management systems (LMSs). [5]

Positive perceptions about implementing a low-cost LMS have resulted in the beginning of such systems into more and more organizations, institutions and businesses. Open source learning management systems have already considerably penetrated into higher education, and are making roads in the business sector, especially for small businesses.

Advocates recommend that a desire to avoid higher costs, hardness of commercial or proprietary products, and increased confidence on LMS vendors have greatly inclined motivation to choose open source software. Many organizations come across that open source software brings other profit. For example, it is beneficial if an entire school district, university, federal agency, or small business can inaugurate a LMS without having to buy multiple per-seat or site licenses. [1]

C. What is Moodle?

Moodle, which stands for Modular Object-Oriented Dynamic Learning Environment and it, is the best system for online learning management system and for exceptionally flexible for course management for the instructors. According to The eLearning Guild Research *360°Report on Learning Management Systems*, published in May, 2008, [1]many Guild members preferred it. (*Editor's Note:* This information is accessible for download as a PDF file by Guild Members, Members Plus, and Premium Members, and by Associate Members who contributed in the survey upon which the information is based.)

Moodle progress took place as doctoral study by an Australian, Martin Dougiamas. Today, Moodle has involved a long list of developers dedicated to Moodle improvements. Figure 2 illustrates the Moodle site at www.moodle.org, where we may come across more details about developers and consumers, as well as links for downloading the demand itself. Figure 3 depicts the Moodle based LMS named Prinsems Educator Gateway implemented in Prince Sultan College for Emergency Medical Services. [6]

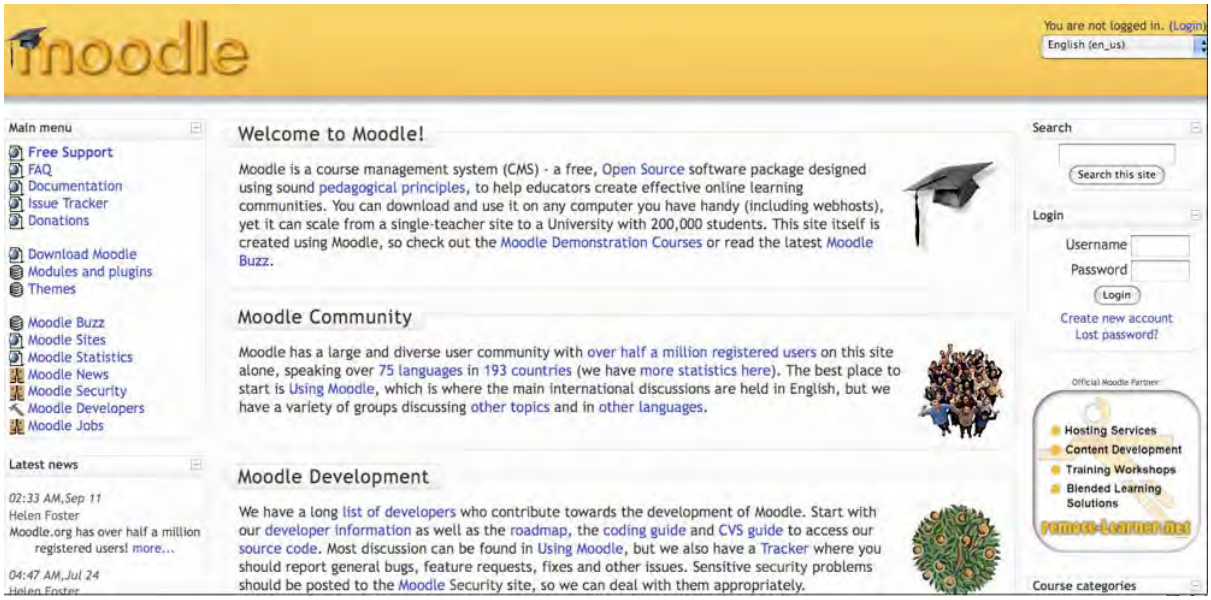

Figure 2 *the Moodle Website*

D. Market share

Introduced in 1999, Moodle has enjoyed fabulous growth in the last couple of years (see Table 1). [1]

TABLE 1 GROWTH IN MOODLE USE WORLDWIDE, 2006 — 2008

	2006	2008
Registered Sites	> 22,000	> 49,000
Users	> 9,000,000	> 26,000,000
Courses	~ 900,000	> 2,400,000

Growth has been mainly fast within the higher-education marketplace. More recently, [7] Moodle is discovering increased recognition even outside the education sector. Guild research explains that Moodle is making its most saturation in the small-to-medium business marketplace. Figure 3 illustrates the usage reported by Guild members in the last 12 months for the education market (669 higher education and K-12 institutions), and Figure 4 shows the usage in the same period for all business organizations (1,932 organizations).

In the previous 12 months, Moodle's "grand total" in the education market was only 34.1%. Its expansion in this sector came at the cost of Blackboard and "Developed in house." In the business market, the alteration was even more impressive. For the previous 12 months, Moodle had a market share of 18.6%, in second place behind "Developed in house," which at that time accounted for 24.4% of the business organization installations. Moodle appears to have gained market share, not only against the home grown LMSs, but also against SumTotal Systems and Saba.

	1 - 50 workers	51 - 500 workers	501 - 2000 workers	2,001 - 10,000 workers	More than 10,000 worke..	Grand Total
Blackboard, Inc.	37.9%	50.0%	68.2%	61.1%	51.1%	**56.7%**
Moodle	58.6%	50.0%	37.9%	42.6%	31.9%	**45.3%**
ANGEL Learning	6.9%	20.8%	8.3%	5.6%	14.9%	**10.9%**
Desire2Learn Inc.	6.9%	6.6%	5.3%	8.3%	8.5%	**7.2%**
Developed In-House	10.3%	1.9%	3.8%	5.6%	10.6%	**5.6%**
eCollege	5.2%	3.8%	0.8%	5.6%	8.5%	**4.2%**
Oracle	3.4%	3.8%	1.5%	0.9%	2.1%	**2.3%**
Resource Development Company	3.4%	0.9%	2.3%	0.9%	4.3%	**2.1%**
Articulate	5.2%			1.9%	4.3%	**1.6%**
Skillsoft, Thomson NETg	1.7%	0.9%	0.8%	2.8%	2.1%	**1.6%**

Figure 3 *the top 10 LMSs in use by 669 education organization, as described by eLearning Guild members in the last year. (Source: Guild Research)*

	1 - 50 workers	51 - 500 workers	501 - 2000 workers	2,001 - 10,000 workers	More than 10,000 worke..	Grand Total
Moodle	48.2%	24.6%	15.3%	12.7%	6.3%	**22.1%**
SumTotal Systems Inc.	7.3%	9.8%	12.3%	17.6%	24.8%	**15.4%**
Saba	11.3%	8.2%	10.4%	12.0%	21.4%	**13.7%**
Developed In-House	17.6%	13.1%	8.6%	8.1%	13.7%	**13.1%**
Blackboard, Inc.	16.6%	13.7%	9.8%	7.7%	7.4%	**11.0%**
Plateau Systems, LTD	5.3%	7.7%	9.2%	9.9%	13.7%	**9.4%**
Skillsoft, Thomson NETg	8.0%	7.1%	5.5%	10.2%	11.7%	**9.2%**
Oracle	6.0%	3.8%	6.7%	12.0%	8.8%	**8.0%**
Learn.com	4.7%	7.7%	11.7%	7.7%	3.1%	**6.3%**
GeoLearning	5.6%	7.1%	6.1%	4.2%	3.1%	**5.1%**

Figure 4 *the top 10 LMSs in apply by 1,932 business associations, as described by eLearning Guild members in the last year. (Source: Guild Research)*

In the starting of 12 months, Moodle's "grand total" in the teaching market was just 34.1%. Its expansion in education sector came at the expenditure of Blackboard and "Developed in house." In the business market, the change was even more inspiring. For the previous 12 months, Moodle was having a market share of 18.6%, in second place behind "Developed in house," which at that time reported for 24.4% of the business association installations. Moodle comes out to have grown market share not only in comparison to the home-grown LMS, but also in opposition to SumTotal Systems and Saba. (*Editor's Note:* Readers who have contact to the eLearning Guild Research Real Time Direct Data Access to the 360° Reports can view this data online.)

But is Moodle prepared to acquire on the enterprise-wide needs of a large corporation? It is kept in mind for two things as you come across at the market input to figures. Classically, in big organizations and corporations Moodle implementation is limited to departmental, divisional, or experimental use. And among Guild members in the education sector, Moodle hardly ever crashes as many learners as a commercial product, such as Blackboard.

Whether we are functioning in education, government, or the production sector, we cannot close the eyes to Moodle's access into the LMS market. While Moodle isn't about to substitute proprietary enterprise-wide products like Saba's Enterprise or SumTotal's TotalLMS, Guild members are utilizing and liking Moodle a lot.

E. Why Moodle based LMS?

The majority of current LMS 360° Report, members who accepted Moodle report at high satisfaction rates, small costs, and easy operation and use. Ninety-five percent of the consumers indicated that they did not have it in mind to find an alternative solution.

In ten years, Moodle has already attracted a huge and various user communities. There are 345 sites with more than 10,000 consumers. Moodle's obvious demand is that it has the potential of generating cost-effective online education communities in rich and poor countries similar.

In higher education, Moodle's status also shoots from the academic community's standards of freedom; examine review, and awareness sharing. Followers say that Moodle helps educators to create an effective joint online-learning community using sound educational principles at a very low cost. We can install it easily and speedily, it can scale up to contain a huge user base, and it provides distinctive LMS features present in most similar commercial products. Moodle renew are common, the development society is very supportive, and its worldwide use is providing trustworthy learning solutions. [1], [5], [11]. Most of these thoughts concern as well to business organizations, particularly small ones.

F. What are Moodle's advantages?

Surveys, including those done by eLearning Guild Research, explain a variety of advantages and disadvantages for utilizing Moodle. Advocates emphasize important advantages, such as:

- Lower overall cost for ownership
- Higher security
- Peer re-evaluation
- Better flexibility
- Ability to customize by changing code
- Inspection ability and code availability
- Technical maintain
- Proper tested updates and plug-ins
- Variety of facility and tools

Many state that cost savings is not the solution Moodle advantage, but it is rather right to use to various innovative tools that border with the Moodle platforms. Others like the loyalty to open standards, and the support of interoperability, roles and client management, use of innovative plug-in, and the support from online societies of practice.

Others like the large user society that fosters reliability, correctness, review, quality, responsibility, collaboration, and better communication. Moodle users find that the width of talented people existing is so great, that they can speak with a developer or download a patch at every time of day, anywhere. Moodle is serving the education globe set, follow, and maintain standards. Others advise that Moodle developers are leading the approach in e-Learning technology innovation because they can effort as a community with frequent interests, and encourage collaboration in the detection of knowledge sharing and fast development.[8]
Finally, Moodle is accessible in many languages, thereby significantly growing the reach of the LMS to educators everywhere. Anyone (students and instructors alike), can decide to view a Moodle site in an unlike language just by choosing the language from drop-down menu on the upper-right corner of the screen. For instance, if Chinese selected, the look of the site (menus, tabs, and other labels) will transform into that language. Educators can simply improve learning based on local inclination. Note however, that Moodle does not interpret the content itself. Any user-generated content remains in the language it was entered in.

III. WHAT IS LEARNING MANAGEMENT SYSTEM (LMS)?

The learning management system is the communication that distributes and manages instructional content, recognizes and calculates individual and organizational education or training goals, tracks the improvement towards gathering those goals, and brings together and presents data to supervise the learning method of an organization as a whole [12]. Learning management systems permit students to view multimedia lectures, to be in touch with their teachers and each others in learning communities, download course supplies, take online quizzes and accept homework and class work assignments. In addition, these systems are used to improve the in-house faculty organization. The details of these complex systems are determined together with a lot of modules in their implementation. For instance, teachers can create course with specialized course tools, or they can generate them in web-ready HTML form with multimedia data. In such a situation, both users and teachers can be confused as to which are the correct modules to use for achieving the projected goals. If the system has 20 modules, it is using all 20 modules suitable for any given situation. If the teacher utilizes every available feature, will he and the students have sufficient time to focus on the process of learning? Even if only certain

modules are used, the diversity of courses existing at a university might create a changed learning environment for each course. [9]

A. Major Benefits of a LMS

The major benefit of using an LMS includes:

- Control over registered users as well as any kind of special user.
- Provides a safe environment for learning.
- Learner centric, not only course centric.
- Communities can take into custody and retain shared knowledge / learning.
- Comprehensive right to use controls – content can be made as confidential or as private.
- Provide chance for institutions to maintain links with previous students and connect with future students

B. Blogs and Wikis vs. LMSs

The major question regarding many educational institutes is whether they require a comprehensive learning management system (LMS) or whether they are better with license fee and accepted Web 2.0 tools, like blogs, Wikis. LMS's are planned to handle everything. The reason to choose LMS is that, people have to be positive to become dynamic users of online learning environments. If a blog is utilized in one course and a Wiki in another, and for a few course we have to utilize a separate calendar application, these tools (or web sites) do not obtain to be used. But if we have an situation, where you have to log in to come again some assignments, check out our calendar, take part in a meditative conversation or even discussions on subsequent student party, we tend to call all our online classes through the same log-in. There are numerous other reasons to use LMS over the Blog and Wiki is like easy to use. Moodle has its own simple Wiki, which can be used for mutual writing, such as preparation projects together or group writing exercises. The simple procedure of editing and saving that a group work can build up rapidly without students need to be in the same place at the same time.

IV. MOODLE AN INTEGRATED LMS (PRINSEMS EDUCATOR GATEWAY)

Moodle is an e-learning tool that can suggest simple and safe solutions to any institution, no matter how big or small, be it an individual teacher or a vast university. Moodle smooth the progress of online group's effort, which can be teacher-to-student, teacher-to-teacher or student-to-student. With Moodle, we can create learning spaces called 'courses'. Each course has its own set of property and activities, called 'modules' in Moodle, and can be modified in conditions of association and appearance. We can make the courses password so that only enrolled students or teachers have right to use their courses. We can also put limitation on time limit to the courses. Once a course is set up, then we can load it with activities and texts, together with audio and video. Students are also free to access those manuscripts whenever it suits them. Moodle works on the whole when combined with face-to face learning – also known as blended learning. Here are a few illustrations of what can be done by us: [10]

- Enhance the teaching with online additional activities.
- Provide students with links to websites applicable to a course.
- Upload a series of learning performance produced in some authoring software,
- Ask students to reproduce on their learning throughout a blog or a journal.
- Work in groups to co-author a manuscript using a Wiki.
- Put up a list of things for students to do before coming to a lesson.

V. FRAMEWORK OF LEARNING MANAGEMENT SYSTEM WITH THE HELP OF MOODLE

The Library and Information Professional can take part in an essential role in designing and association of resources for the LMS. The job that can be done contains:
Categorize chapter plans and learning items at the departmental level, classify documents by department level in order to generate searchable arrangements that use explanations based on those who utilize those documents. Connect educators together who contribute to similar interests through tags. Information professional can also do unintentional learning through the detection of resources and information shared by others. They can generate a unique shared tag where anyone can attach to a detailed set of resources by knowing the unique tag word, which could then be combined through RSS feeds. Figure 5 shows an example of a Moodle based LMS in the college.

Figure 5 *the Moodle based LMS – Prince Educator Gateway implemented in our college*

VI. PRINSEMS EDUCATOR GATEWAY ATTRIBUTES OF MOODLE BASED LMS ASSIGNMENTS

Students can upload their assignments for teachers to score these assignments. Teachers get an automatic alert through email as well as SMS when a new assignment uploaded [11]. All results can be stored in the Moodle based LMS database. There is not needed to worry about losing score sheets. Learners can yield tasks in any file format (e.g. MS Office, Acrobat Reader PDF, pictures, a/v etc.).

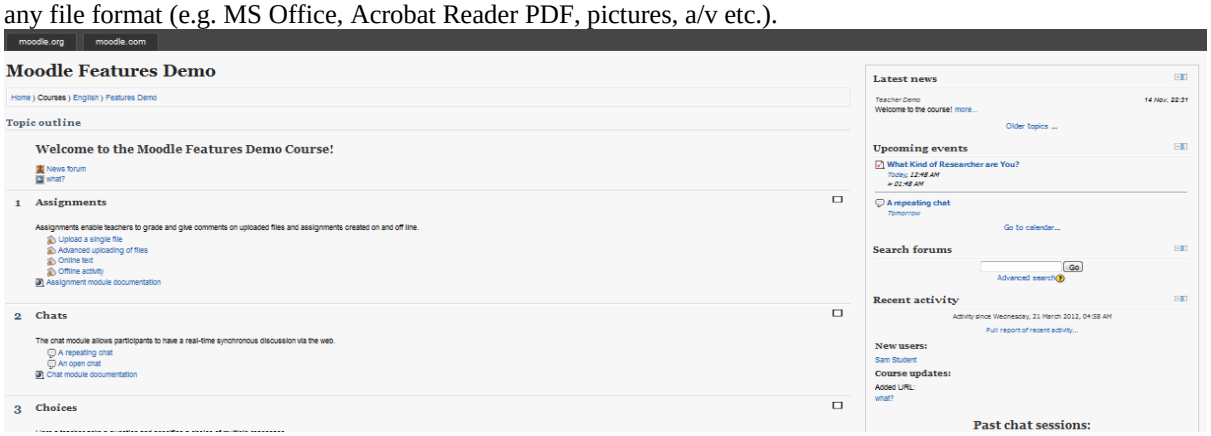

Figure 6 Main user interface of Moodle based LMS (http://demo.moodle.org/course/view.php?id=5)

Few features of Educator Gateway have been described one by one and any of the remaining attribute can be tested directly by clicking on the link in figure number 5.

A. Chat room

The Chat module permits participants to have a real time synchronous discussion through the web. This is a helpful way to acquire different thoughts of different person and the subject being discussed - the mode of applying a chat room is quite different from the asynchronous

B. Forum

This activity can be most significant in terms of serving learners to construct innovative knowledge. Discussion takes place between the participants and teachers. Forums can be controlled in different ways, and can contain peer rating of each posting. The postings can be seen in a variety for formats, and can contain attachments also. To subscribe a forum, participants will obtain copies of each new posting by different users and these messages will be received in their email or as settings made by LMS admin or individual instructor. A teacher can require subscription on everyone if they want to:
Forum group properties include:

- How students are authorized to post to a forum
- Whether subscription is forced.
- Maximum volume of attachment uploads.
- Whether posts can be rated and by whom, the type of rating range used and how Students can see these ratings, and a time period in which ratings can be useful.

C. Choice/Questionnaire

A choice activity is very simple – the teacher asks questions and indicates a choice of multiple answers. It can be helpful as a quick poll to motivate thinking about a topic; to permit the class to cast their responses on a direction for the course; or to collect research feedback.

D. Database

The Database module is high-quality for building searchable repositories. A general use of this module is for keeping past exam papers, performance for students to do or print out, or collections of students' work.

E. Glossary

The Glossary is similar to the database, except that you can permit users to rate each other's offerings. Words can be hyper linked to texts on the site. So students can click on a hard word in a text and they will automatically be taken to the description we provide in the glossary. Glossary entries can be characterized to make searching easier. Typical uses are an A–Z of complicated words and gathering of useful websites.

F. Lesson

The Lesson module permits a teacher to write a sequence of lesson pages, each one finishing with a question. If the students reply it successfully, they may continue. Otherwise, they can be sent back to reassess the lesson or directed to a corrective page. This permits students to use up as much time as they want or need on difficult questions.

G. Calendar

Keeping a calendar of events is important to both student and course instructor. Events can be generated for different categories, including:

- Global events that becomes visible in all courses (system admin).
- Course events put by an instructor.
- Group events set by instructor family member only to a group.
- User events set by student (e.g. due dates, personal etc.).

Upcoming Events can be seen on the course homepage, alerting the beginner across all courses they are enrolled in of different group events. Alerts are colour-coded by grouping.

H. Quiz

Quiz module permits the teacher to design and put quiz tests, consisting of multiple choices; True/false, short answers questions etc. These problems are kept in a branded database, and can be re-used inside courses and even between courses. Quizzes can permit various attempts. Each effort is automatically marked, and the teacher can decide whether to give feedback or to explain correct answers. Quiz module contains grading services also and many more features.

I. Web quests

It permits you to group students, create a web page for the main task, set up the links and give chat and forum spaces where the groups can talk about their projects. Students can then use the assignment tool to upload the marks of their work, or they can use the forum module to show their work.

VII. ROLE OF LIBRARIES AND LIBRARIAN

The library, as a knowledge base, is the collection of all documents, organization, tools, services and environment that actively support the use of records for knowledge creation.

The role played by librarian is to be inclined with knowledge base and continuously increase its worth for the betterment of the world. They provide support for both students and teaching faculty in the development of learning. More particularly, there is want of keenness for student and teacher community in the academic world. The most successful support system for teaching faculty is to build up course contents for the development of difficult teaching methodology. [12]

The following are the stages which a librarian provides on building L M S:

a) In the progress of collection (contents)
b) In providing value added services.
c) Hyperlink the e-courses with the library e-reference resources such as e-books and e- journals as well as with the web-based open-access assets
d) Great effort to design integrated web portal to provide friendly access library scholarly e- resources with efficient browsing and research abilities.
e) e-literacy programmes to expand e-learning information search skills;
f) Acquisition of core e-collections specifically that recommended by e-learning initiative;
g) Encouragement of library e-services to the virtual e-learning community; and prompt document delivery and outreach services via electronic transmission 8 efficient helpful tools to support instructor-created e-course. [12]
h) Facilitation of scholarly communication and virtual classroom collaboration.

VIII. CONCLUSIONS AND DISCUSSION

The integration of e-learning in educational institution has up till now focused on providing learners with the thoughts and skills necessary to use the centrally run learning management systems. This has been useful for creation the technology see-through for the learners who have never had experience in working of a web-based learning environment. Learners are excited having the influence to design and distribute their individual online content, and the capability to expand their own online education activities without facing any technological constraints. However analysis of learning management systems from learners come when challenges are prepared to design learner-centred online activities that are combined, reflective, experiential, participatory and networked crossways a wider community of nobles or experts[6]. With the rise in attractiveness of technologies such as blogs, Wikis, RSS and community-building tools, new opportunities have been shaped for communicating, sharing ideas and to join them in the learning process. It is time to focus on online learning support in institutes to move towards giving learners with the preference to create their own learning networks. These environments would perfectly go ahead of the artificial construct of an individual unit of study that make up their programmes, and preferably beyond the individual programme.

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