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Research Article

Learning management system developments and challenges: A literature review

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ABSTRACT

Learning Management Systems (LMS) are web-based software that is used to create and deliver educational content in a controlled and measurable way. They are designed for an LMS-specific teaching process. These systems are available in different forms and can be purchased as open source or closed source solutions. This paper provides an explanation for the LMS and the approach used to implement it. We introduce and describe background study of LMS and discusses the advantages and disadvantages of LMS. Then the study on other LMS existing systems that have the same purpose of this project and explains the advantages and disadvantages of these systems to come out with new system have all feature. Finally, we provides the comparison study with some related system in term of advantages, drawbacks, techniques, features, technology.

1. INTRODUCTION

Initially known as "Internet-based training," E-Learning was later renamed "Web-based training." Today, these names and derivatives of e-learning also including elearning, Elearning, and eLearning are still being used today. (Stafford, 2010). Contemporary distance education, at least has been in existence since the period of Isaac Pitman shorthand class in Great Britain through letters and communication in the 1840s. Pitman was a practicing and experienced teacher that teaches at a private school he established in Wotton-under-Edge. He started a distance learning course, and use to send homework to his students through email and whenever they complete the assignment they send it back to him. The author noted, "The technique for mastering drill and informative material was in many instances basic and clear enough to allow for the automation of much routine instruction." The author also created a teaching device that resembles a typewriter and has a window that displays one question with four possible solutions. When a user presses a key that corresponds with the correct response, a counter in the behind the machine records the result and displays the next question. When the user is finished, the scorer will reinsert the test paper into the machine and record the result on the counter [1]

The Altair 880 in (1975) which was the first personal computer was swiftly followed by the IBM PC and the Apple ii. But with the IBM and the Apple the computer was dependable satisfactorily, due to this it was used for didactical purposes. The way it was being used was increasing particularly in the area of mathematics and science. Simulations and programmed instruction were most often used [2]. They use computer to make current, tasks easier to implement. The computers are useful for some teachers and also serve as teaching aids for them. It is not only innovation in the field of education but also substitution of some teaching materialism. The learning management systems (LMS) were used at the end of the 90s. Although some universities started to design and develop their own systems but most of the educational institutions started with systems off the market. Dr. Mirande asserts that the usage of the blackboard really influence and changed the educational institutions due to the fact that it was the first period when teachers will be accepting and using technology within the four walls of their classrooms [3]. The figure 1 shows the E-Learning system components.

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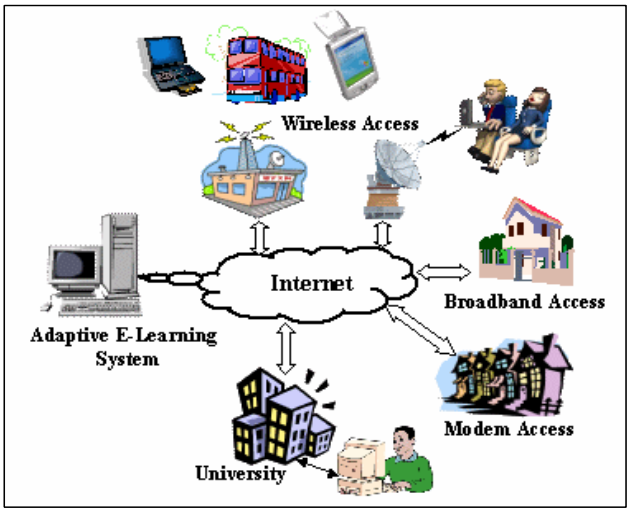

Fig.1. E-Learning system [4]

2. E- LEARNING'S ADVANTAGES AND LIMITATIONS

It is essential to give careful consideration to both the positive aspects and the negative aspects of e-learning.

TABLE.I. ADVANTAGES AND LIMITATION OF E-LEARNING

Advantages	Limitation
• Class activities can schedule and take place within work and family setting. • Reduces travel time and travel costs for off-campus students. • Students have the option of selecting whichever they would like to study subject that is best to them in terms of interest and knowledge • There is barrier of distance to students' learning in as much they have internet connection and computer • Students follow their modules at their pace • Discussions can be held at any moment in bulletin board threaded areas and chat rooms with colleagues and instructors. • Students and teachers agree that eLearning facilitates more instructor-student interaction than traditional lecture or class rooms. • E-learning supports various learning styles and activities. • The user will learn computer skills throughout their lives, which will help them. Online or computer based study will assist the learners in building self- confidence and self-knowledge thereby enable them to take charge of their self-learning • Learners is at liberty to skip over the areas they have already mastered and focused their attention on the areas that contain new information	• It's possible that students with low motivation or poor study habits have fallen behind their peers. In the absence of the customary measures used in a typical classroom, • It's possible that students won't understand the routines and procedures of the class. • In some cases, students may feel disconnected from the classroom and their peers. • Instructor may not always be available when students require assistance or are engaged in study. • The process may be time-consuming and laborious if only an older computer or a sluggish internet connection is available. • For students with limited computer experience, tasks such as managing files and navigating online learning software can appear daunting. • Normal simulations of laboratory or practical activity are difficult to create. Instructor might not always be around when students need • help or during studying • If the internet connection is slow or only old computer is available the work might be tedious and time consuming Managing computer files and online learning software can sometimes seem complex for students with beginner-level computer skills • Lab work or hands-on is not easy to simulate in a normal classroom

In Table 1, the advantages and disadvantages of E-learning are laid out, with "Flexibility" listed as one of the benefits due to its role in allowing students to study at their own pace. The major disadvantages, on the other hand, are isolation between the student and his/her instructor that made the availability of both of them difficult at the same time.

3. STUDY ON EXISTING LMS

There are many too many LMS available these days like BlackBoard, Sakai, Moodle, Joomla LMS and Desire2Learn. In this project, the researcher studied two systems which are Moodle and Joomla LMS.

3.1. Moodle

Moodle is a platform for creating online learning environments and other types of websites. It's an international improvement plan made to help a social constructionist with school building. Moodle was originally an abbreviation for Modular Object-Oriented Dynamic Learning Environment, and it is advantageous for both programmers and education policymakers. It may also be defined as the practice of indolently twisting through anything; they do this as it seems to them; it is a fascinating fiddling that typically results in creativity and insight. As a result, it pertains to both the origins of Moodle and how a teacher or a student could go toward acquiring or influencing knowledge via an online course. Moodle can be programmed into computer that can run PHP, and can assist an SQL type database (for instance MySQL). As well it can be installed on Windows and system that operates MAC and many flavors of Linux. There are many knowledgeable Moodle associate to assist, as well host the Moodle site

Below are the features of the Moodle learning management system:

1. Generally, the full control over all setting belongs to teacher for a course Part of this is that teacher can assign roles to teachers that are less privileges
2. The selection of course forms, which may be based on a weekly structure, a topical structure, or a discussion-centered structure. The individual course layout and theme can be created for any course.
3. Offer adaptable sorts of course activities including quizzes, glossaries, forums, options, resources, Assignments, Surveys, workshops, and conversations.
4. Regarding grouping, instructors and students may be assigned to one or more groups.
5. Constant updates of the course based on the fact that the last login can be displayed on the course's home page; this contributes to a sense of community.
6. In terms of the Content areas that is displayed for the students to be seen contain an HTML editor tool bar that possess standard ways of editing the functions, as well as an html code view.
7. Mail integration – forum discussion can be printed and posts, teacher comments etc. can be mailed in HTML or blank text. Users may prefer to put their daily mails to their preference for daily emails in their report.
8. Custom scales - in terms of grading forums and assignment teachers can design a rubric that can guide their assessment.
9. Courses can be scheduled in a single block. The Backup job allows courses to be compressed into a zip file. They are recoverable on any Moodle system.
10. Specific course methods and materials can be imported into another current course

Despite the fact that the system has some benefits and is revered by a few institutions, still there are a few disadvantages and defects. This is, because everything cannot be perfect. The most important issue is that Moodle is not completely developed to withstand big projects. It might not work efficiently if it used in lager educational institution and might not be easy to use in conducting class in a city but might be useful in some colleges or universities with lower medium size population. The second example is more speculative than realistic, but if the Education stakeholders were to adopt such a concept, Moodle might not be the greatest option. Equally, the number of students that use the platform will determine how faster or slower the system becomes. Therefore if students are more it will be slow. This might be problematic whether students are attempting to take exams or quizzes, or just acquire access to course materials. Occasionally, the website may also be unavailable, preventing students from accessing course materials.

The Moodle users may not constantly complain about the difficulties they encounter with customizations, although in addition to that there is a lack of complete development. In order to perform effective and efficient customization, one need to know how to program and have some types of knowledge in terms of coding. What is largely seen as a negative by users is the lack of personnel capabilities. It is right that the program is aimed for delivering course content, however it would be good if a specialists on system was included to assist students and staff members and efficiently interact with those who give guidance in studies. The Moodle is facing some problems which serve as restrictions in the area of assessment abilities. For instance, some blocks are displayed on the pages that prevent system manager to add content there [5]. The main shortcomings of using Moodle that many users criticize or comment on are as listed as follows in addition to table 2 that shows the aadvantages and limitation of Moodle:

A) Integration with systems for human resources is difficult.

B) Incompatibility with student management solutions.

C) Difficulty implementing a concept of distributed management with numerous schools and departments.

D) Inefficient utilization of interface space.

TABLE II. ADVANTAGES AND LIMITATION OF MOODLE [6]

Advantage	Limitation
Technical assistance Frequent updates and add-ons Low ownership costs Significant degree of protection Source code provided Continuous review and maintenance More adaptability Capability to be tailored to your needs Diverse abilities and instruments Constructed in multiple programming languages	Integration with systems for human resources is difficult. Implementing a dispersed management approach with several schools and departments is challenging. Inefficient utilization of interface space. Incompatibility with student management solutions.

3.2. Joomla LMS

Joomla LMS is the commercial component of the Joomla content management system. PHP and MySQL provide the foundation of the Learning Management System. Students can build native LMS courses or integrate SCORM 1.2 as well as SCORM 2004 courses using Joomla LMS.

In addition to features such as Discussion, Chat, DropBox, JoomlaLMS, and Homework, conventional learning management systems also offer the following:

1. It possesses a document management tool that aids in storing documents, sorting, creating, and editing them, and then linking them to other documents in libraries.
2. Built-in writing techniques: Question pools and quiz builder, which allow teachers to create tests and store a pool of questions for use in future quizzes or exams.
3. Live conference tool: utilized to deliver a Virtual Dynamic Classroom that relied on Flash Player Media Server.
4. Learning Path: enables the instructor to arrange the course fundamentals into a sequential learning program that improves the student's comprehension of the subject matter and prevents the student from skipping portions of the lesson.
5. Grade Book: This logs students' grades and, if appropriate, provides course certificates.
6. Course Statistics; each course has a metrics statement that includes information such as the course's most active users and which areas/tools are utilized in what percentage.
7. This information can be tailored to each student or group.
8. Embedded Subscriptions module: develop a method for offering online paid courses. User roles are as follows Learner, Trainer, Assistant, Administrator and CEO/Parent.
9. Self-registration and self-enrollment.
10. Enrollment and Registration should be by administrator approval.

The Joomla LMS Professional is an integration of e-learning tools gathered into a powerful and potent but valuable management solution. It is a greatly useful eLearning platform along with ground-breaking educating and testing options, together with conferencing services and authoring tools and the interfaces to a mass of intermediary applications extensions

[7]. Joomla LMS Professional was designed for easy management of online content, as well as management of distance learning procedures. It also aids in creating and supporting infinite numbers of online learning programs; which can be located and sighted by students from all over the globe. The license of Joomla LMS is expensive because it depends on the number of the user. For the small institute it is considered cheap, but it will not suit the large colleges and university because they have a large number of the student and lecturer. In addition, it is hard to integrate it with student management systems or to integrate with human resource systems.

4. COMPARISON BETWEEN EXISTING SYSTEMS.

Below is the comparison between the Joomla LMS and Moodle according to the criteria listed in table 3:

TABLE III. COMPARISON BETWEEN JOOMLA LMS AND MOODLE

Product Name	JoomlaLMS	Moodle
Internal Email	• Instructors can email the entire class at once at a single address or alias.	• Students can use a searchable address book.
Real-time Chat	• The chat tool supports a structured way for students to ask questions and instructors to provide answers.	• Students can create new rooms. • The system creates archive logs for all chat rooms.
Whiteboard	• The whiteboard supports image and PowerPoint uploading. • The software supports graphing, polling, and instructor moderation. • The software supports group web browsing. • The software can archive a recording of whiteboard sessions for future viewing. • The software supports two-way voice chat.	N/A
Automated Testing Management	N/A	• The system supports proctored tests. • The system supports Remote Quiz Protocol which allows questions to be rendered and scored externally to the system via standards-based web services.
Course Management	• Instructors can release materials • Based on a single criteria. • Instructors can set up specific course content that is released on a specific date and must be completed by students before they continue with the course. • Instructors can personalize access to specific course materials based on previous course activity.	• Instructors can personalize • Access to specific course materials based on group membership.
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 reports showing the time and date and frequency students as an aggregated group accessed course content. • Usage statistics can be aggregated across courses or across the institution.

5. COLUMS

COLUMS is the campus management system that enables the users to manage colleges and universities with multiple disciplines and campuses, delivering services on demand to help achieve Business, academic and social goals. The system facilitates comprehensive management of the 4 columns of any education institute. With the business support column, the management is empowered with over 200 pre-set and customizable reports for indebt view into operational and academic status. A comprehensive marketing planning and portals for students and the parents', covers the management of the institute from the business perspective. The academic column handles student lifecycle, tutors management, time tabling, class room management and examinations. The role based access provides workflow for students, faculty and staff to access services collaborate any task, anywhere using from a choice of multiple devices.

The Admin column provides centralised and integrated financial management through all departments of the institution. The inventory and procurement system facilitates to maintain an optimised stock of stationeries and supplies through a transparent procurement management system. Executives get a 360 degrees view of campus operations and employees access HR services online. The Facilities management column helps in efficient management of transportation, Cafeteria, hostels and library whether run by vendors or the institution. The core of the system, there is a flexible architecture that allows customer to respond dynamically to change. User can easily manage multiple campuses on flexible terms and integrate your choice of software.

5.1. Feature of the system

The system supports the full range of organizational processes:

1. Student life-cycle management
2. Loan management
3. Financial management, budgeting, and planning
4. Relationship management, institutional development, and enrollment management
5. Governance and compliance
6. Human capital management
7. Procurement
8. Enterprise asset management

Colleges and universities may manage the entire student life cycle, from admissions to alumni relations, with the help of the COLUMS MANAGEMENT SYSTEM including:

1. Maintain central records of students that capture the personal and academic information of students throughout their academic careers.
2. Academic organization and class scheduling
3. Define and classify academic programs and course offers.
4. Manage accounting for students, fee calculation, and bursar duties.
5. Recruitment and admittance: Handle admittance submissions on time and in accordance with institution-specific regulations.
6. Oversee standards that a student must meet to earn a degree.
7. Student information administration
8. Manage rules pertaining to admission, registration, enrollment, and examination.
9. Offer web services and standardized procedures to provide a streamlined, end-to-end approach for managing the entire student life cycle.
10. Detail each student's progress toward meeting defined academic requirements

Additionally, the COLUMS Administration SYSTEM delivers enterprise management and support capabilities, allowing educational institutions to:

1. Handle procurement processes effectively
2. Handling Employee Payroll
3. Manage organizational performance
4. Provide data with analytical insight
5. Provide parents/guardians with access to student information
6. Administer Foreign student and employee immigration
7. Recruit and retain qualified individuals
8. Manage the inventory of the Institute

9. Manage funds from PTPTN as well as financial institutions
10. Comply with regulatory requirements

5.2. System integration

It could happen almost any time (even late in Christmas Eve), that someone may receive or buy something requires some assembly with clarifications attached. This person may spend hours in assembling something which is supposed to be easily assembled, but couldn't figure how to fit pieces with each other. Even if that person is humbled to the extent that he uses the instruction manual, the puzzle continues to be ambiguous, and if it is solved that'll be by trial and error, or calling the manufacturer for many times, or with the help of somebody who had already done it before. Taking into consideration the people responsible for designing the diabolical contraption (wickedly odd shapes) in first place, in which they have to design and find each part and make it, work all together [8].

Within the past years, the system integration has been on top of IT sector. There are various definitions, for the system integration, which differ according to researchers and practitioners who mostly approve that system integration is difficult and sophisticated, but not impossible. System integration indicates various things to various groups of people. System integration is defined by author in as the process of joining the functions of a set of subsystems (software and hardware) to produce a single unified system which backup the organization requirements [9]. Another definition of systems integration is presented as: "the assembling of various hardware (such as computers and telecommunication systems), software (such as accounting, desktop publishing and personnel management) and human interfaces to accomplish a specific goal" (Abu Bakar, 2003). However a more simple definition is: "A service to make user's isolated computers link each other and make them much easier and more useful" [10].

5.3. Fundamental problems of systems integration

As institutions become more dependent on information systems that are computer-based, the challenge of systems integration has appeared in both further and higher education to provide support for both administrative functions (Human Resources, Finance, Student Records) and teaching functions, learning and research (Virtual Learning Environments, electronic resource discovery tools, etc.) [11]. In 2006 surveys conducted on more than half of the companies, and the results showed (figure 2) that the major obstacle in expanding the process and business management support is due to the difficulties with the integration of the existing system [12].

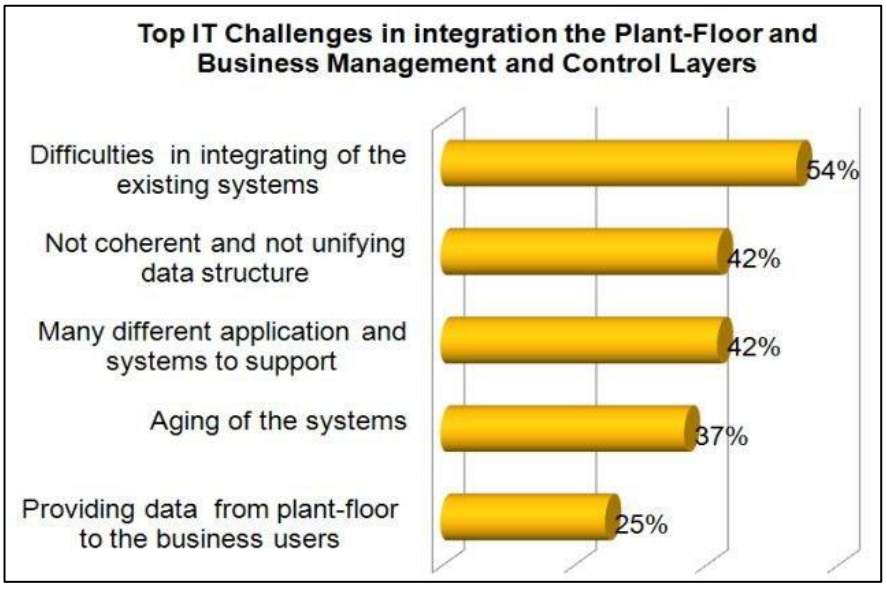

Fig.2. difficulties with the integration of systems

The variations of the existing systems; their non-unified data architecture and quantity, lead to other major integration problems. Because of these problems it is not easy fulfill the increasingly complex functions and, lastly, to acquire an overall process efficiency, which needs fast and powerful vertical communication and exchanging of data among the systems. The

COLUMS system is working with ASP.NET and C# technology and MS SQL as database, while Joomla or Moodle are using PHP technology and MySQL as database, therefore the integration of these system will be more complex and have limitation of this process like:

1. Using web services (middleware component) to get data from the Moodle or Joomla. If there is any update in the Joomla/Moodle it will affect the middleware.
2. Its need to extra server, like Apache server to run the PHP and anther server for MySQL database, which means extra resource that may cost the company more money.
3. It requires employing new staffs that are familiar with PHP and Mysql, which means increasing the budget of the system.
4. Integration of two systems with different technology, increase the possibility of having bugs during the implementation, to fix these bugs more time is needed than the time spent on fixing the error in homogenous system.
5. Sometimes the time needed for merging the system exceed the time spent on adding the features of one system to the other one.

According to the explained drawbacks for the current system, this project proposes some solutions to be added by learning management system to COLUMS, which has four different kinds of user student, teacher, course creator and administrator. Course creator can add, edit, delete, change the published status of the course, import, and export course then assign the course to the teacher, who will manage the content of the course. Each course has topics and extra features that support the curriculum like add, delete and edit announcement of the course. Add, edit and delete document needed by the student to teach the course, assign homework to the student by the teacher, and student submit it after working on it. The student can share the files between each other by using drop box, and they can submit to quiz which is designed by the teacher. The topics of the course consist of three item first one is (Chapter) used to organize the content of the course; second item is (study page) which contain scientific material of the course and the third item is the (quizzes).

6. CONCLUSION

The paper shows a description of concept for the E-Learning system taking into consideration what people think of distance learning since the nineteenth century, and how other people design teaching machine to answer the question, where the invention of computer and communication make easy to implement. It also provides the advantages and limitations of the E-learning system. It included other related works and existing system on learning management system; in the term of how the student can study the material of course using the activity and feature of the course, and how the student can cooperate between each other and also with their instructor with conclusion of each system. Finally, comparative study is provided of the existing systems on E-Learning system.

Conflicts of Interest

The paper explicitly states that there are no conflicts of interest to disclose.

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