

RESEARCH PAPER

Enhancement of Moodle learning Management System Regarding Quizzes Security and Stability Problems

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ABSTRACT

This study aims to enhance the security of Moodle system environment during the Execution of online exams, Taking into consideration the most common problems facing online exams and working to solve them . This was handled by improving the security performance of Moodle Quiz tool, which is one of the most important tools in the learning Management system as general and in Moodle system as well. In this paper we include two enhancement aspects: The first aspect is solving the problem of losing the answers during sudden short disconnection of the network because of the server crash or any other reasons, the second aspect is Increasing the level of confidentiality of e-Quiz by preventing accessing the Quiz from more than one computer or browser at the same time. In order to verify the efficiency of the new quiz tool features, the upgraded tool have been tested using an experimental test Moodle site.

Key words :

Moodle (Modular Object Oriented Dynamic Learning Environment), E-Quiz ,eLMS (Electronic Learning Management Systems)

I. INTRODUCTION

E-learning is one of the most noticed advanced forms that have been emerged in educational institutions, it is one of the most important products that gained from the utilization of Information and Communication Technology in education. Integration of e-learning with any educational system has become of strategic importance.

E-Learning is defined as a method of learning that depends on multimedia and information and communication technologies to deliver the educational content to learners in such a way that allows them to interact

effectively with the content and communicate with the teacher and colleagues synchronously or asynchronously. In order to satisfy this requirements and manage all academic activities effectively this could be done only by using one of the E-Learning Management System (eLMS). Which is defined as a system designed to help managing, tracing and evaluating Educational courses and all associated activities in educational institutions using Internet or local networks.

II. Literature review

The importance of e-learning comes from its distinguished properties. As e-learning affords many techniques for providing an interactive learning environment with multiple e-sources, making education more flexible. using multiple methods of teaching that suits different types of learners and topics.

E-learning could be offered in Three ways :either Supporting -Integrated (Blended) or full online and If we want to apply any kind of e - learning it is more useful and more efficient for achieving educational goals and managing the courses is to use an eLMS rather than using other web 2.0 applications .

e-LMS are considered as "integrated software packages that provide a complete system for managing the e-learning process and provide communication between all the participants of the educational system at any time and from any place through the internet in order to improve learning." All e-LMS share a portal that represents the infrastructure through which learning content is delivered and managed, and contains a set of tools that could perform a variety of tasks related to the management of learning across networks and enables the educational institution to manage, organize, and present studying courses and training programs

A. Types of e-LMS

Learning management systems are divided into two main categories:

1. Open source systems , which are used free, and can not be sold by anyone, and could be developed and modified, examples of these systems: Moodle- Dokeos -Atutor- Ilias. [1]
2. Commercial systems that are owned by a profitable company and are developed and not allowed to be used without a license Examples

of these systems WebCT - Blackboard- Desire.,and it is noticed that Blackboard, Moodle, Sakai, Web CT are the most popular and most widely used learning management systems

B. e-LMS Components

The e-LMS must have all the elements, and tools necessary to manage the process of delivering the course in an integrated manner on the right educational rules and within the international standards and controls.

e-LMS needs a technical requirements such as computer network, computers, assistance programs and a qualified technical staff .

C. Characteristics of eLMS

The eLMS software packages have many different characteristics, but they all share the following functions:

Provide the ability to present the e-courses contents including all types of scientific content and activities in an organized and easy navigation manner that enables management of these courses, and also provide communication tools (forums, virtual rooms, chat, through computers and mobile devices.) , provides student registration , Manage student records and follow up students performance and assessing exams.

D. Moodle e-LMS

Moodle is used by thousands of educational institutions around the world offering online courses and to supporting the traditional education. It is an open source software under the GNU General Public License. That means everyone is allowed to download, install, use, modify and distribute it for free.

Moodle works easily on any computer running PHP, for Unix, Linux, Windows operating systems. It can support many types of

database, especially Mysql, which is available in dozens of languages including Arabic.[2]

Moodle was developed by Martin Dogiamas(2002). The system consider educational rules in its structure. It is based on an educational theory described in its documentation. There are hundreds of developers around the world where Moodle is exposed to continuous updating. Moodle can serve a university of 40,000 students and supports many languages and is designed using PHP and MySQL.and supports the Global Standard for Digital Course Design (SCORM).

E. The security settings available in Moodle eLMS

Moodle's basic design provide good security against the common types of vulnerabilities these settings are allowed only to the system administrator as shown in Fig.1

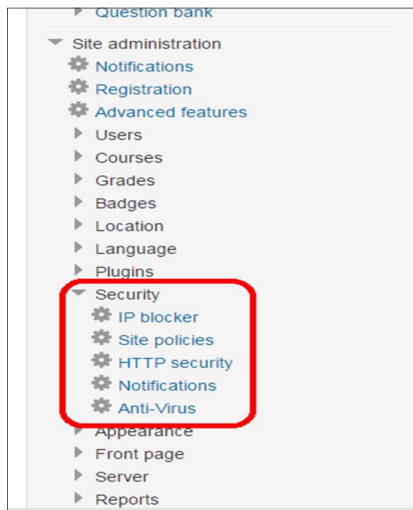


Fig. 1 Moodle security settings

This fundamental security settings is performed as through the following tools :

1- IP blocker, and It is performed by the following path Home►Site administration ► Security ► IP blocker

2- Site Polices, and It is performed by the following path Home ► Site administration ► Security ► Site Polices

3- HTTP Security, and It is performed by the following path Home ► Site administration ► Security ► HTTP Security

4- Notification, and It is performed by the following path Home ► Site administration ► Security ► Notification

5- AntivirusSecurity, and It is performed by the following path Home ► Site administration ► Security ► AntivirusSecurity

III. Related work

Related studies in Moodle eLMS considering technical issues are not widely available specially the security issues, here are some studies related to the current study

Enhancement of the adaptive performance for Moodle eLMS in the educational content.

The objective of the study in [3] was to develop adaptive performance for Moodle eLMS at the Islamic University in Gaza, where the development included four Aspects: (interface, content, tests, and assignments),

To achieve the required Enhancement, some modifications have been made to the moodle eLMS code and In order to ensure that the development of adaptive performance is appropriate The researchers conducted .A statistical survey to the students for assessing the Moodle performance using the T-Test statistical method Before and after the enhancement done to it ,the study concluded to the following results, there were statistically significant differences between the students assessment for Moodle performance before and after the enhancement in the four aspects at the level of ($\alpha = 0.01$) .

.Biometric Verification System in Moodle & their Analysis in Lab Exams

The purpose of the study in [4] is to identify and classify trends and issues related to information security in e-learning focusing in discussions forum "Security and Privacy" of the Moodle Learning Management System. Four core topics were identified; the covered Topics are authentication, permissions, attacks, moodle configuration. The article serves as a descriptive case study on how to describe , discuss and deal with security issues by Developers, users and administrators within the open source software development Moodle

Detection and Prevention of XSS Vulnerabilities in Moodle

The paper in [7] Analysis the security of Moodle eLMS services as well as solutions to its security vulnerabilities. As Moodle is the same as all web application that vulnerable to illegal attacks so, the study focused in .Cross site Scripting (XSS). As it is one of the serious attacks that faces moodle the same as all web applications vulnerability that occur whenever a web application takes data

In this study [6] Php's functions were discussed that used to prevent XSS attacks Additionally a comparative study between four published filters was conducted to determine their weakness, then RT_XSS_Cln filter was developed to prevent XSS attacks. Using Php language RT XSS_Cln filter is written , Comparing with the other filters. RT_XSS_Cln filter provide a high protection against XSS attacks . RT_XSS_Cln filter evaluated by performing online and offline testing, offline testing is done by about 80 files containing about 1000 malicious scripts, while online testing is done by plugging RT_XSS_Cln on

the Moodle from both sides and students' side teacher's side to protect both sides. RT XSS_Cln filter overcomes that other filters' weaknesses, it's more accurate than the other filters due to its ability able to prevent all XSS tested scripts (1000 scripts), also RT_XSS_Cln filter is faster than the other filters it has a little processing mean time than the other filters.

IV. Proposed Work and Result

The proposed work of this study is to increase the level of confidentiality of the quizzes performed in simultaneous access to the same e- quiz account from computers other than the computer specified for the Quiz, and also to handle saving the Quiz responses in case of late submission due to network failure. In Moodle infrastructure the Quizzes were served by the Moodle server. So in order to enhance the quiz security we should add more security options than those built in moodle quiz settings, by installing extra extension tools to moodle quiz settings. In this study two extensions (plugins) were installed in order to enhance the quiz security and the network Stability Problems.

To achieve the proposed results for this study an experimental method was used, and a sample of students were adopted to carry out the experiment.

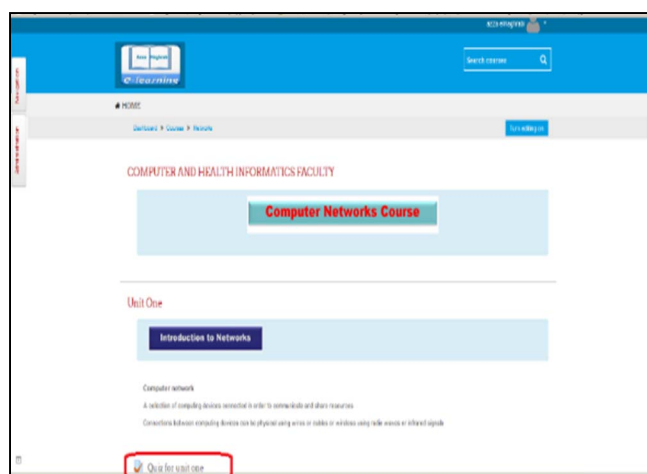
We started by installing a copy of Moodle Software Version 3.1 from Moodle website , After the installation was completed, all the basic settings for the site were done, then, an experimental course was added and modules were created inside the course . Users registered as students. The required extensions (plugins) have been installed for developing the Quiz tool .

The function of the installed Quizaccess_offlinemode plugin in the created

experimental site, is to control and solve network disconnection during Quiz access and to avoid losing quiz responses due to network disconnection problem.

The function of the installed Quizaccess_onesession plugin in the created Moodle experimental site, is that when the student first enters the Quiz page, the course information (account, IP address) is recorded. If any one tries to access the Quiz from other computer or any device simultaneously, the browser will be blocked. Accordingly, any attempt to access the Quiz from any other device will not be allowed

After installing the two plugins and check the installation successfully. An experimental Quiz was created inside the created course in the experimental site as shown in the Fig.2 below.



The basic Quiz Settings was performed (password and quiz time) students were informed for the quiz time to come to the computer lab in order to take the quiz
The quiz consist of 10 questions created as shown in Fig.3

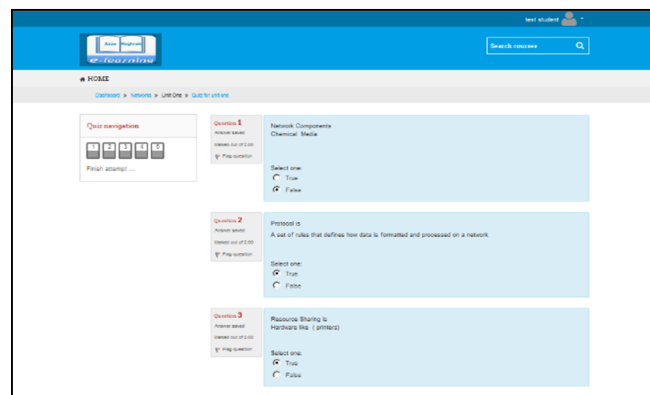


Fig. 3 Quiz First Page

Before starting the quiz by the students in order to activate the two plugins quizaccess_offlinemode & Quizaccess_onesession plugins they were executed by controlling the plugins settings in quiz setting page as shown in Fig.4

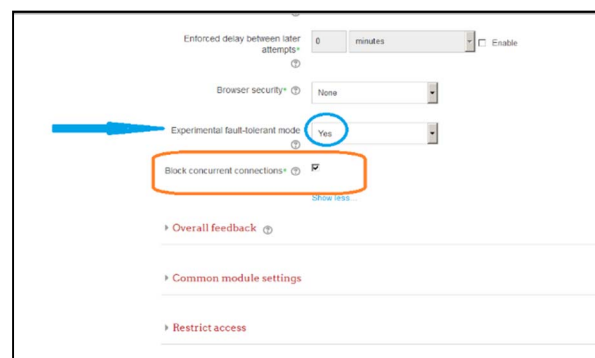


Fig.4 plugins settings page

The first plugin Quizaccess_offlinemode facilitates the possibility of offline answers save .furthermore, the user can continue to switch between the trail pages. This plugin also provides the download link, so the user can save the answers to a file inside the same device; this is useful in case of long period network disconnection. Sending the quiz responses completed when the network resumes connectivity

To examine quizaccess_offlinemode plugin, the quiz session was initiated students login and start their attempts , then the network was disconnected by turning off the server during quiz attempts for two minute in the first attempt, and five minutes for the second attempt respectively during the the quiz time. Students were able to continue answering the quiz and save the answers but could not submit them till the network is connected again the answers were found saved successfully in the two attempts. when the network resume connectivity, the responses were submitted as shown in Fig.5. and all the questions were marked successfully as they appears in Quiz result page as shown in Fig.6 below:

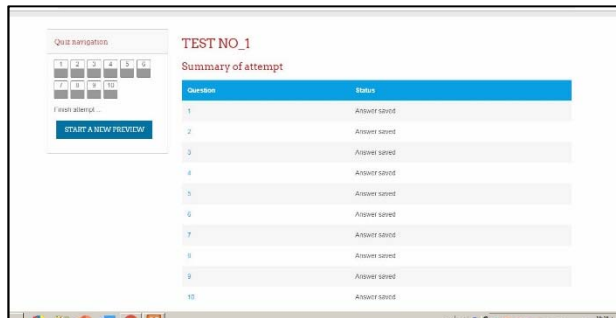


Fig. 5 The page that display saving confirmation of all questions

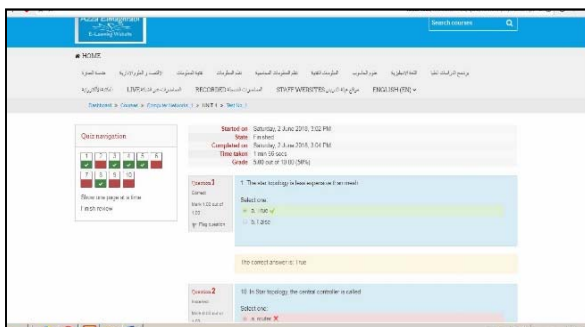


Fig. 6 Quiz result page

To examine quizaccess_onesession plugin, by trying to accesse Quiz during the quiz excution. When the quiz starts we try to log in to the quiz using one of students

account who is taking the quiz from another computer, the result is that; the access was blocked even if the attempt was implemented by using different browsers.

All these attempts from other computers gives blocking message as shown in the Fig. 7

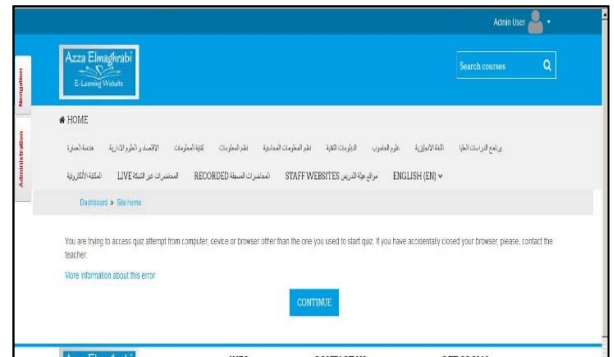


Fig.7 Moodle block message for the attempt

Also this restricted access data was recorded and this Login is reviewed in the login reports as shown in Fig. 8

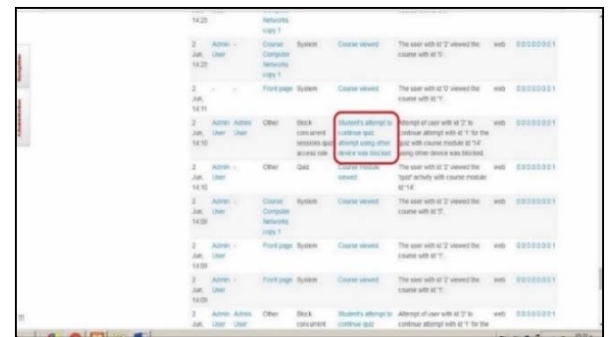


Fig. 8 Logs Report page

Conclusion

This study investigates that Moodle eMLS could be more efficient by adding extra features using Moodle extensions and in this study we achieve the performance required for solving Moodle quiz problems due to the enhancement done which results in an excellent security performance regarding quiz tool.

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