Proceedings of the 33rd International Conference on Information Technologies (InfoTech-2019)
19-20 September 2019, Bulgaria

EXTENDING AN OPEN SOURCE LEARNING MANAGEMENT SYSTEM (OPEN ECLASS) AS A STUDENT PROJECT

Digest of paper[1]

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Abstract: Learning management systems (LMS) are predominant in supporting all levels of education. Many educational institutions rely on open source systems that are free. Even though such systems are mature enough, there is a constant need to be extended. In this work, we present our experiences and lessons learned in attempting to extend an open source e-learning system, Open eClass that is widely used in Greece, in the context of a student project. We expect that our work will help toward forming a framework for facilitating community contributions to open source e-learning systems such as Open eClass.
Key words: E-learning, Learning Management Systems, Open eClass.

1. INTRODUCTION

Higher-level educational institutions are currently relying on learning management systems in supporting their courses. They are mainly used as on-line repositories to maintain course material accessible by students any time and to provide a variety of educational activities such as discussion forums, exercises, tests, questionnaires etc. Even though there is a large selection of paid products many institutions rely on free and open source systems with the most popular being moodle [1]. Another system that has gained a lot of attention in Greece and that is used virtually by all Universities, Colleges and other organizations is Open eClass [2]. It is developed and supported by GUNet [3], a non profit organization hosted by the University of Athens in Greece. Its origins can be traced back to the Claroline LMS but it has established its own development path since 2003.

[1] The full paper is proposed for including in the IEEE Xplore Digital Library

One of the basic motivations behind this work is to explore the feasibility of leveraging the contributions of talented students in higher-level educational institutions and in particular in those involved in computer science or other related programs, in extending the functionality of open source e-learning platforms. Students start getting familiar with these systems very early in their academic program and they are organically connected and related to most of the concepts involved in them. We expect that this familiarity will be advantageous when they are called to work on providing extensions. In addition being users themselves, they might have formed their own opinions regarding possible improvements. All these could motivate them to understand the underlying technology and to be involved in fixing issues or implement additional useful functionality and extensions.

For the current study, we did not want to come up with an ambitious list of requirements but rather proceed with smaller tasks and then incorporate more functionality as long as progress is achieved. Therefore, the most important achievement is that we got involved in an area that could be very fruitful if we can help in setting up a framework for student contribution and cooperation in open source e-learning systems.

The remaining of this paper is organized as follows: In Section 2 we describe the extension requirements. In Section 3 we provide the research and the analysis for understanding the system. In Section 4 we describe the implementation process and in Section 5 we provide a discussion, our conclusions and suggested future work.

2. REQUIREMENTS

The requirements for the extensions came from needs we observed while using the platform in a class settings and are shown on Table 1. We wanted also to understand how feasible would be to transfer useful functionality observed in other platforms.

Table 1.

High Level Requirements	
1	*Student Group Extensions*
	*Open eClass provides the concepts of **group of students** and **group categories**. There are two major group settings for student registration. Single group or multiple group. We felt the need of having a new setting that would allow single registration in a particular category but multiple registration among categories. This would allow an instructor to be able to partition students according to different functions (e.g. lab group, assignment groups etc)*
2	*Information Exporting*
	Provide functionality to export exercises/tests and questionnaires as pdf documents so that the instructor could design and implement a test or a questionnaire online but at the same time have the option to produce them in a paper format in case the conditions of conducting a particular test or survey does not permit the participants to access a computerized system. Additional areas we considered was the exporting of the attendance book and instructors note, as xml and text files respectively.
3	*Creating a new Module*
	We wanted to become familiar with creating a new module in the platform

3. RESEARCH & ANALYSIS

We relied on three sources of information in order to understand the application so that we could implement the desired extensions shown in Table 2.

Table 2.

	Research Resources for Understanding the Application
1	***Reverse Engineering [4]***
	We used BOUML [5,6] to scan sources of Open eClass version 3.5.6 and Moodle version 3.4.2 and to produce UML class diagrams
2	***Database Schema***
	We used phpMyAdmin to reverse engineer the database schema and create database diagrams depicting the tables columns and table relations
3	***Development Site [7]***
	We have found the development site very useful, in particular in understanding the following aspects: • *The Database access layer for accessing the database and submitting queries.* • *The utilization of the existing components ActionButton and ActionBar that control the way users demand actions either by pressing some button or by selecting an operation from a drop down menu.* • *The inclusion of additional modules in the application* • *The utilization of third party libraries that have been incorporated in the installation.*

4. IMPLEMENTATION

Regarding the first requirement after studying and analyzing the current implementation, we decided that we could satisfy our requirement with the modifications we outline in the Table 3.

Table 3.

	Student Group Extensions Requirement
1	*Extend the range of values of a configuration parameter SETTING_ GROUP_ MULTIPLE_ REGISTRATION. Originally, it could hold the values 0 and 1 for the two distinct types of groups (unique membership or multiple membership). We added a third value indicating unique membership in a category.*
2	*Extend the database table group_category that represents categories with an additional attribute (select_registration) that will characterize type of membership in the category. The field can hold two values (1 for unique membership and 2 for multiple membership).*
3	*Modify the User Interface to enable a user to select the right setting. We modified the php file group_settings.php.*
4	*Introduce a new page in the group module to manage the new category setting*

Regarding the information-exporting requirement and in particular for exporting into pdf there are two basic phases. The first one is the retrieval of the information (e.g. questionnaire) by applying a group of sql queries to the database and building a html document. The other utilizes calls to the TCPDF library in order to build the pdf document from the html document created in the first phase and additional attributes we provide though library calls.

Regarding the examination of creating a new module, we have implemented a trivial module just to understand the process, which we could consider quite simple

and straightforward. There is a need for simple modifications of several configuration files main.lib.php, init.php, setting.php, messages.inc.php so that the name of the new module will be included in initializations. There is also a need to provide upgrade functionality so that when a new version is installed on a site then old courses would have access to the new module. Finally, we followed an index.html template available at the development site for creating the module and define some content on the first page. The are more implementation details in [8].

5. CONCLUSION

In our report, we have shown that the open source community supporting software platforms such as E-learning systems could benefit in extending the functionality provided by harnessing work done in student projects. In our study and in particular in connection to the open source e-learning platform Open eClass a motivated student can be acquainted with the platform design and implementation details and be able to implement useful functionality.

We consider instrumental in this effort guidelines developed and offered by the managing organization, in order to reduce the learning curve, because solemnly relying on insights gained by reverse engineering practices could be counterproductive. However reverse engineering could be helpful in discovering and analyzing certain aspects or modules.

Regarding further extensions, protecting user privacy has already emerged as an important concern in e-learning systems [10]. A new module for preserving the student anonymity in course evaluations could be implemented on practical ideas proposed in [11].

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