

Motivating Attendee's Participation in Distance Learning via an Automatic Messaging Plugin for the Moodle Platform

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Abstract— Technological advances in information and communications systems are enabling access to education for millions of students, regardless of their geographical location. In this sense, distance learning schools take advantage of technological tools, such as course management systems (CMS) and their plugins. This work proposes a plugin for the e-learning platform Moodle that automatically sends e-mail messages to the students in order to motivate them to take part in the distance learning courses and, consequently, to reduce the dropout rates. This plugin has been tested in courses promoted by the General Coordination of Distance Education (CGEAD) of the Brazilian National School of Public Administration (ENAP). Based on data from its operation within the real ENAP distance learning environment, the proposed plugin is particularly successful to tackle the enrollment locking cases that compose the student dropout rate and also to motivate course enrolled students to access the virtual learning system more frequently.

Keywords— Automatic messaging, Moodle plugin, Distance learning motivating tool.

I. INTRODUCTION

Technological advances in information and communications systems are allowing access to education for millions of people, irrespective of their geographical location. Distance learning (DL) can break down geographical barriers meeting the dissemination of knowledge needs [1]. In addition, DL is becoming more common even as a support tool for standard educational systems. According to [2], DL is already part of the daily lives of thousands undergraduate and graduate students worldwide.

Despite the several advantages that are offered by DL, students motivation is one of the factors that directly affects their success rate [3]. In this context, despite all the available technology, more solutions are necessary to effectively support DL school managers to motivate students' participation and consequently to reduce dropout rates.

Particularly, there is a lack of tools to help DL managers map the reasons for the dropout rates caused by the non-commitment of students and low academic performance. Moreover, there are no computational tools or plugins integrated to free and open-source software learning management systems, such as Moodle [4], in order to analyze the attendee's behavior during the course and to motivate them by sending e-mail messages.

This paper presents a proposal of an automatic messaging plugin for Moodle platform that has been developed based on the needs of the direction of the General Coordination of Distance Education (CGEAD) of the National School of Public Administration (ENAP). The proposed plugin improves the interaction between course managers and students in order to reduce the dropout rates by motivating students to stay connected to the courses. By evaluating the dropout rates in 2015 at Enap, it is shown the effectiveness of the proposed plugin by reducing dropout rates and increasing students' motivation in accessing the environment education.

This paper is divided into four more sections, besides this introduction. In Section II, a theoretical background and related works showing the importance of the topic are presented. In Section III, the proposed automatic messaging plugin for Moodle platform is detailed. The results obtained after using the proposed plugin are shown in Section IV. In Section V, conclusions are drawn and directions for future work are provided.

II. STATE OF THE ART

Among the main DL educational platforms, Moodle [4] is an open source system, collaboratively developed by the virtual community that supports the expansion of a single teaching ambient for students, administrators and teachers, being a safe, robust and integrated system. Moodle is composed of modules or extensions called plugins. Plugins are smaller software systems that are incorporated into larger ones to play specialized functions [5].

In [6], it is highlighted the need to bring new ways of communication and interaction between students and teachers. In this sense, the technological center of Costa Rica developed its own educational platform for the purpose of sending, receiving and viewing SMS messages looking for a better interaction between teachers and students [6]. The system in [6] also allows students and teachers to run commands on the platform through text messages.

The work presented in [7] discusses a chat system, in which students can discuss the content of the courses and ask questions to their teachers and other students. The mechanism proposed by the authors does not require that everyone is online and there is a system of recommendations for the user to facilitate their search for useful content. Note that there is an important difference between the proposal presented in [7] and the presented in this current work, which is the fact that in the proposed plugin the message exchange is automatic.

Paper [8] suggests a delivery architecture that learning management content using the email system manager and its architecture for regions with low communication throughput.

Paper [9] proposes a life cycle model for DL, which facilitates interaction of students within DL, using a DL Lifecycle Management (DLLM) model that is intended to cover any organization in which there is a need to manage and run the DL. With the model in [9], the authors achieve a higher quality of education distributed to the students and an increase in attendee's feedback.

The work in [10] addresses the attendee as an active role in the creation and sharing of resources in DL. In order to show this usage, an example to exchange information and messages between students and teachers using Moodle 2.0 applied to Google Drive resources is presented. The general opinion of the students and teaching reputation is taken into account.

III. THE PROPOSED AUTOMATIC MESSAGING PLUGIN FOR MOODLE PLATFORM

The proposed automatic message plugin aims to reduce the dropout rate and to motivate the students to stay connected to the courses. The plugin enables the DL managers to send personalized messages to the students whenever they reach certain predefined conditions.

Figure 1 presents the operation flow of the plugin and the necessary information to send a message to an attendee. In step 1 of Figure 1, the system goes through all the courses with classes in progress. In step 2 of Figure 1, the system checks the messages that are registered for a given day of a course. In step 3 of Figure 1, the system compares the conditions of each attendee in relation to the corresponding day class of the course. In step 4 of Figure 1, the system checks if the condition is registered in a message to be sent, while in step 5 of Figure 1 the system forwards the message to the messaging server. In step 6 Figure 1, the message is sent to the email of the registered attendee.

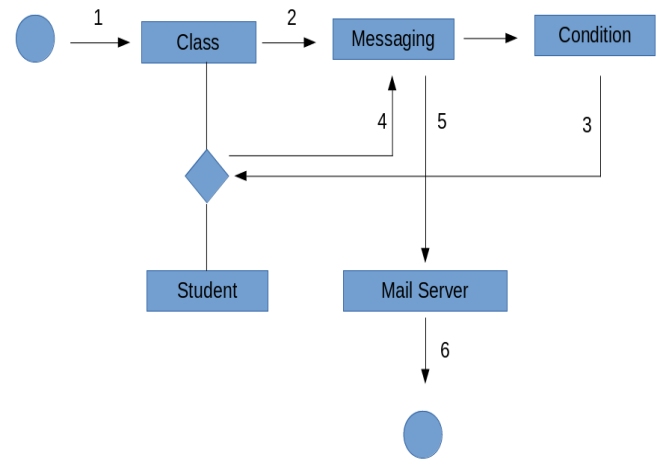


Figure 1: Overall message sending flow of the proposed automatic message plugin

In Figure 2, the block diagram presenting the information flow of the user interaction processes is depicted. Note that the main stream and the three alternative streams complement each other and have the same goal.

The main flow of the system interface is a click action "New Message / Edit / Delete Message" and then the system records in the archive the messages that should be sent to students in a specific course. In the first alternative flow A1, the user fills the data for the message including sending conditions, message date, subject and message body and confirms its completion. Then the data is recorded on the database and the system displays a confirmation message, and exits the alternative flow A1. In the alternative flow A2, the user changes the data and confirms their completion, and records the changes on the database. Then, the system displays a message confirmation and closes the alternative flow A2. In the alternative flow A3, the system displays a question, updates the message and database, and displays the confirmation message, finishing the alternative flow 3. Note that the This diagram in Figure 2 presents no flow exception.

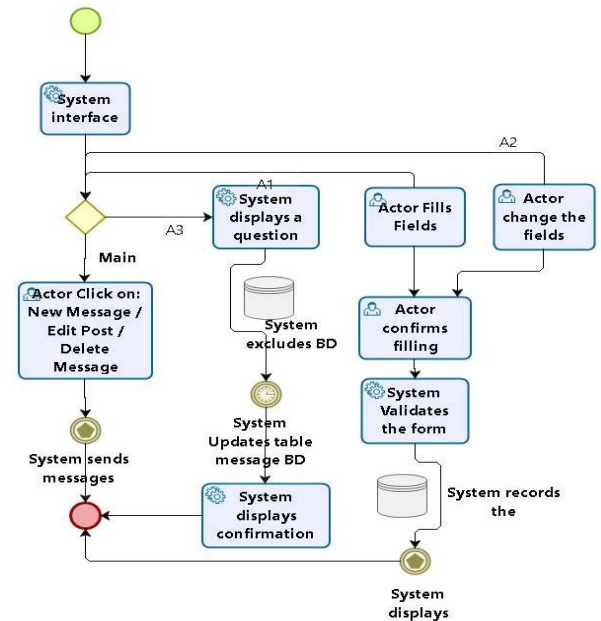


Figure 2: User interaction processes with the proposed automatic message plugin

Figure 3 shows nine types of predefined conditions that are considered in the proposed plugin. The first condition is the case of user without access into the e-learning system. The second condition is when the user already accessed and has no grade on an evaluation activity since the course started. The third condition is when the user has no grade past seven days before a message sending date, although has in practice concluded an activity. The fourth condition is when the user obtained grades below the minimum score, but he/she can still conclude the course by improving his/her grades on the next activities. The fifth condition is when the user did not make any evaluation activity. The sixth condition is when the user fails all evaluation activities. The seventh condition is when the user has successfully passed the activities. The eighth condition is when the user abandons the course. Finally, the ninth condition includes all students of all conditions. Besides the selection of groups of students by conditions, the students can of course be selected based on other educational criteria that can be specific to a certain course.

Register / Edit Message

Student status:
 Select a situation to send... ▼

Attendee without access

Attendee already accessed and has no grades on evaluation activity

Attendee without grades in the evaluation activity this week but that did some activity

Attendee that is below the minimum mark and can still be approved

Attendee failed in all evaluation activities

Attendee disapproved who made all evaluation activities

Approved attendee

Quitting attendee

All

Combox with options to select as the situation of the student throughout the course.

Figure 3: Wireframe representing the selection field with the conditions for sending messaging to students.

Instead of selecting the students by considering some specific condition, the DL manager can also select the students by the course and then observe the history of sent messages. Figure 4 presents an example of a frame with the history of sent messages.

Specific templates of messages are automatically loaded in order to facilitate the work of the DL manager. For instance, in Figure 5, the proposed plugin displays a template of message for the second condition in Figure 3. Note that the message can be adjusted if necessary to mention some specific aspect related to the particular attendee. As depicted in Fig. 4, once the condition and the time period are chosen, the template message appears with filled fields of the subject and the text.

In Figure 6, another example of template message is shown. This example addresses the situation in which the attendee is below the minimum grade, but can still pass the course. Note that the message warns that the course is ending with motivational words. Stating that despite not having a

minimum passing grade, the student with a little more work and effort will be able to complete the task and reach the note.

Class Name - Course

Message *

Post Message

▼ Situation	▼ Message	▼ Day of course	▼ Sending History	▼	▼
Dropout user	Text messages that you receive	5º	Wednesday 11 dec 2015 - 11:52	Edit	Delete
User already accessed and has no note on evaluation activity	Text messages that you receive	10º	Wednesday 17 dec 2015 - 11:52	Edit	Delete
User that is below the minimum mark and can still get it	Text messages that you receive	14º	Wednesday 25 dec 2015 - 11:52	Edit	Delete
Approved User	Text messages that you receive	22º	Wednesday 25 dec 2015 - 11:52	Edit	Delete

Figure 4: Wireframe the system displays lists the messages registered in determine course.

Post / Edit message

Student status:
 Select a situation to send ▼

Day of course
 4º ▼

Subject:

Message:
 I noticed that you accessed the {course name} – Introduction to Project Management, but according to our system, no evaluation exercise has been carried out.
 Since we are already during the last week of the course, we recommend you to visit the course and start making the evaluative exercises.
 Come on, with a little effort and dedication, your certificate will be guaranteed.
 Do not leave it until the last minute

Figure 5: Registration screen wireframe of messaging received in the mail

Inbox

Hello Luciano Almeida,

I noticed that you accessed the Class 5/2015 course – Introduction to Project Management, but according to our system, no evaluation exercise has been carried out.

Since we are already during the last week of the course, we recommend you to visit the course and start making the evaluative exercises.

Come on, with a little effort and dedication, your certificate will be guaranteed.

Do not leave it until the last minute.

The link for direct access to the Virtual School ENAP Moodle is enapvirtual.enap.gov.br.

Please contact us in case of difficulties, we are at your disposal.

Good job!

Regards,

General Coordination of Distance Education
 Management Development Board

ENAP National School of Public Administration
 SAIS 2A Area - Brasília - DF 70610-900
www.enap.gov.br

Figure 6. Example of messages received by the attendee at the end of the course

IV. RESULTS

In order to evaluate the effectiveness of the proposed plugin, we compare the performance of the students of our e-learning system before and after the plugin. In order to analyze the students' performance, we consider the amount of students who locked their enrollment in the years 2011 and 2012 when it was not yet applied the plugin for sending messages. On the other hand, the students were motivated by the automatic messaging plugin in 2013, 2014 and 2015.

Table 1 presents the amount of enrolled students, the amount of students who failed and the amount of enrollment rates locked per year. Analyzing the results of using the proposed plugin in the ENAP virtual learning environment, the enrollment locking rate has been diminished during the last four years. Indeed, in 2011 and 2012, before the plugin has been designed, the locking rate was of 11 % and 16 %, while after the incorporation of the automatic message plugin, the locking rate reduced to 9 %, 8 % and 7 % in 2013, 2014 and 2015, respectively.

Table 1 – Percentage of dropouts at CGEAD per year.

Year	Total of enrolled students	Students that failed	locked enrollment students'	locked enrollment / failed (%)	Plugin
2011	34,156	9,513	1,046	11 %	NO
2012	28,664	8,244	1,319	16 %	NO
2013	42,078	14,788	1,331	9 %	Manually
2014	60,927	33,666	2,693	8 %	Manually
2015	148,819	74,183	4,958	7 %	Automatic

In order to complete the analysis, we assume the same time period, but we group the students into two categories. In the first one, we consider the students that did not receive messages in 2015, while in the second one, we consider the students that received messages. The students of the first group are divided into five classes as shown in Table 2. Note that the amount of students a day was 23.11 % for the courses without automatic messages. However, as shown in Table 3, for the courses with automatic messages, the percentage of students a day is 37.1 % of the total enrolled in the course. Therefore, the gain of the proposed automatic message plugin is quite significant.

Table 2 – Total and percentage of hits on days without automatic messages.

Classes	Students assets	Average hits per day	Students who access per day %
Class 1/2015	1,085	269	24.8%
Class 2/2015	1,208	289	23.9%
Class 3/2015	1,050	258	24.6%
Class 4/2015	1,371	279	20.4%
Class 5/2015	985	216	21.9%
Total	5,699	262.2	23.11%

Table 3 – Total and Percentage of hits on days with automatic messages sent by the plugin.

Classes	Students assets	Average hits per day	Students who access per day %
Class 4/2015	1,371	349	35.5 %
Class 5/2015	985	532	38.8 %
Total	2,356	440.5	37.1%

V. CONCLUSIONS AND FUTURE WORK

In the above mentioned context, the observation of attendee behavior through online learning tools allows the visualization that simple stimuli in communication can help connecting the students to the virtual school environment, improving their success in the followed courses. The work presented in this paper describes a plugin for Moodle e-learning environment that automatically sends messages to students according to their assiduity in accomplishing the courses' tasks. The results acquired after the usage of the proposed plugin demonstrated a significant decrease in the drop-off and the failure rates compared to these rates before the usage of the plugin. The study also revealed that the days in which the students received the messages, their engagement in accessing the virtual learning environment was higher than in the days in which they did not receive messages. This evidences the usefulness of the proposed plugin in engaging the students in the enrolled courses.

Future work involves better integration of the proposed plugin with analysis tools in order to increase the automation and control.

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