

PERIODIC EVALUATION OF THE MOODLE VIRTUAL LEARNING ENVIRONMENT AS EDUCATIONAL SOFTWARE

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Abstract

This paper presents the Moodle Virtual Learning Environment (VLE) evaluation results, which has been assessed by students enrolled in distance learning (DL) technical courses across Brazil. VLE assessments analyzed functional features such as news wall, forum and chat rooms; and non-functional features related to the adequacy of language, font size, how fast it is to access materials, among others. In order to better understand the overall Moodle evaluation, provided periodically by students, it was necessary to analyze the configuration developed for each VLE, linked to each of the 45 institutions offering distant learning courses, as well as the tools and updates applicable to its implementation. The results presented herein will contribute to technical specifications designed for Moodle tools and emphasize the need to coach Moodle management professionals to enhance the use and adequacy of VLE.

Keywords: Evaluation of an Educational Software, Virtual Learning Environment, Monitoring and Evaluation System

1 INTRODUCTION

Moodle is a virtual environment widely used by distance learning courses across Brazil, such as undergraduate courses at the Universidade Aberta do Brasil (UAB), and technical courses ministered by Rede e-Tec Brazil. According to Machado (2016), many Brazilian public universities use VLE, especially those that offer courses through the UAB System [1]. According to Wilges et. al [2], 94% of the institutions that integrate the Rede e-Tec use Moodle, 2% Amadeus, and 4% other type of software.

Moodle [3] is a Learning Management System (LMS) based on socio-constructionist pedagogy [4]. It is a multi-platform, open source software, distributed under General Public License (GPL), which promotes the integration of new educational technologies. This license also makes Moodle use easier for students and teachers because it brings together, within the course structure, different educational resources.

According to Roncarelli [6], a VLE must meet all the legal, functional, academic, and pedagogical educational processes. Therefore, Moodle evaluation results (as an Educational Software) will contribute to the VLE, so it is configured and deployed to meet its demands in an efficient manner, as far as the pedagogical aspects of the course are concerned.

In this sense, the present assessment aims to provide solutions able to address not only technical, but also pedagogical and usability issues concerning virtual learning environments (VLE), which can be seen as a particular category of educational software (ES).

The works of Oliveira [6], Campos [7], Vieira [8] and Rech, and that of Reategui and Boff [9] have contributed to publications that support educational software projects. According to Webber, Boff and Bono [10] evaluation is an important step during software development process. At this stage, designers identify if a particular software is usable and meets user needs.

In the case of Preece, Roger and Sharp [11], evaluation consists of the systematic process of data collection, being responsible for informing how a particular user or group of users must use a product intended for a particular task, within a specific environment. The assessment throughout the developmental process of an ES must ensure that the software takes into account user needs, how easy it is to learn, how effective, safe, challenging it is, if its language is appropriate and stimulates creativity.

There are several SE evaluation techniques, such as checklists, heuristic evaluation, interaction tests, cognitive exploration, questionnaires, interviews, formal usability inspections, contextual investigation, and research [12].

In the first stage of this research, the evaluation of results provided by students was analyzed according to how easy or how difficult Moodle is to use during the teaching-learning process. Subsequently, researchers needed to know if any kind of customization or adaptation of Moodle tools was used to comply with the requirements imposed by distance learning courses. These evaluations were conducted within the scope of the Monitoring and Evaluation System adopted by the Distance Learning Courses of Rede e-Tec Brazil (SAAS). The SAAS system, as shown in section 3, includes several aspects that must be evaluated in order to extract information used to further improve the quality of distance learning courses. Section 2 introduces the Rede e-Tec Brazil structure, where the SAAS is used, followed by the research results obtained by Moodle administrators, and VLE evaluation results extracted from SAAS database. Findings and considerations from this study are presented towards the end of this paper.

2 REDE E-TEC BRAZIL

Rede e-Tec Brazil is an initiative of the Ministry of Education that focuses on virtually taught technical courses, including early and continuing education of high-school graduates who are already engaged in the workplace, and youth and adult education. The Rede e-Tec Brazil has been developed to contribute to the SAAS system. Since its implementation in 2008, it has reached 27 states. SAAS courses count on an infrastructure of approximately 800 hubs spread across the country.

Rede e-Tec Brazil aims to expand and democratize professional training toward the interior of the country and the outskirts of metropolitan areas, being guided by the needs of economic and social development of each state. For such, the demands of workers for a broader and more qualified training program, as well as social, cultural and regional needs identified by each state [13] must be used as references.

3 COURSE MONITORING AND EVALUATION SYSTEM (SAAS)

The deployment of the Course Monitoring and Evaluation System (SAAS) aims to identify strengths and weaknesses of distant teaching-learning processes and courses. According to Cislighi et al. [14], SAAS is designed to meet the Rede e-Tec Brazil demands (2016), but it can be customized to suit other distant learning courses.

The main results are expected to provide Rede e-Tec Brazil general coordination with comprehensive information regarding policies and allocation of technical and financial resources. They will enable institutional coordination, Rede e-Tec general managers, course and hub coordinators to gather a full picture of each situation, given the criteria adopted by formal regulatory assessments, which determine the requirements needed for the continuity of courses, launching and maintenance of hubs, and budgeting for new courses.

The corroboration of the Higher Education Assessment National System (SINAES) [15] and the observation of the specifics of distance learning models adopted by public institutions in Brazil have established three distinct and complementary focuses that enabled the evaluation of distance learning courses: course, hub, and subject. Each focus includes a set of evaluative dimensions consisting of specific topics.

SAAS proposes a monitoring and evaluation system that promotes decision making and real time contingency measures, as it considers that the evaluation process must be effective so problems are identified and addressed as early as possible. The operationalization of an agile monitoring and evaluation process involves the use of a web-based system. This system enables all stakeholders involved (coordinators, teachers, tutors, and students), whether those representing an institution that offers courses, each one of the hubs responsible for hosting face-to-face meetings, or federal management, to access database instruments and results so they are implemented immediately- fully or partially, if the focus lies upon a particular point of interest.

Thus, the agility required to collect evaluations is also needed when accessing evaluation results, which is only made possible because all results are gathered in a database from which reports can be extracted, considering time series evaluations. It is possible to observe if effective actions and measures taken by course managers are judged to be applicable based on inefficient aspects.

According to Cislighi et al. [14], SAAS considers the following as fundamental steps: data collection, results, and management. It is noticed this cycle is continuous and depends mostly upon institutional managers in order to generate the information needed for the continuous improvement of courses and hubs.

3.1 Methodological procedures

This quantitative and exploratory research has collected data according to two specific perspectives: data provided by students, and data provided by Moodle administrators located at institutions that offer distance learning courses.

Student evaluation was conducted on a regular basis, registered semiannually, from the second semester 2013 through the first semester of 2016, when the virtual learning environment was evaluated.

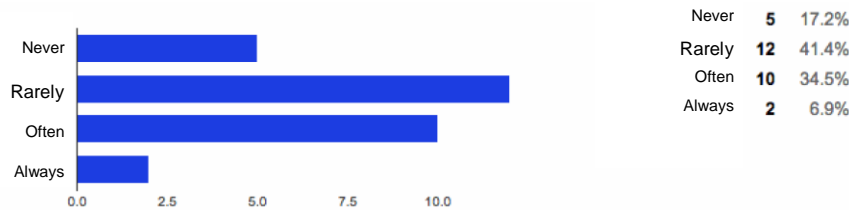
The observation of student demands revealed by periodic evaluations led to the need of understanding how educational institutions were managing the Moodle VLE. For that reason, data was collected from 45 Moodle administrators in the first semester of 2016, among the 55 institutions that offer Rede e-Tec Brazil courses through a distance learning platform.

4 EVALUATION CONDUCTED BY MOODLE ADMINISTRATORS

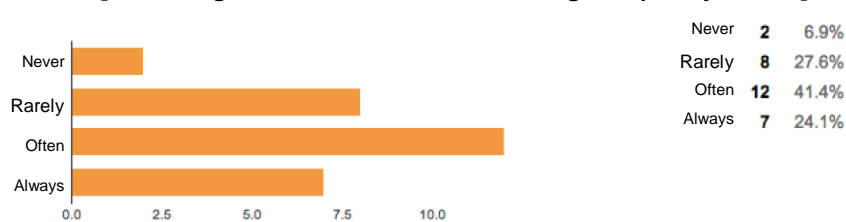
This section shows the results of the questionnaire applied to Moodle administrators, representative of 45 institutions enrolled in the SAAS program, from March to June of 2016. In order to understand how often such tools were used and to check if there were any changes applied to the Moodle environment, we've gathered a total of 29 (64.4%) respondents.

Figure 1 shows that the Forum is the most frequent tool used by institutions (70.0%); being chat rooms the least used, with 58.6% participants (according to "never" and "rarely ever" options).

Chat [According to VLE tools, check the average frequency of use:]



News wall [According to VLE tools, check the average frequency of use:]



Forum [According to VLE tools, check the average frequency of use:]

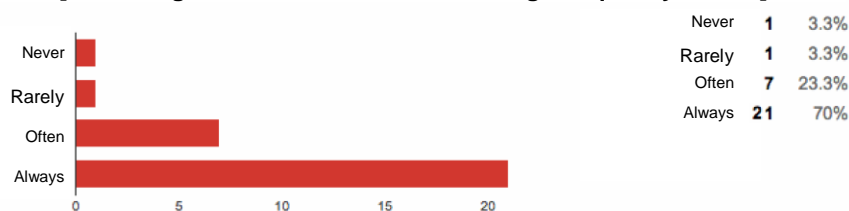


Figure 1. Evaluation of Moodle Functional Resources by Moodle administrators conducted at Educational Institutions.

The questionnaire also inquired if any customization took place in order to enhance the adequacy of VLE tools (chat, news wall, and forum). Only 10% reported that the tools were adapted by modifying

their Moodle installation mode. Some of the opinions regarding forum and news wall changes are shown below:

"Among forum options, the most appropriate was the blog, which facilitates the management of responses and notes."

"By changing templates, there was significant improvement of the news wall and the forum."

Regarding visualization features, usability, and configuration of VLE intended to facilitate access, to find materials, to adjust the sizing of available texts and adequacy of the language used, 66.6% of the institutions did not make major changes to the interface. Yet, the configuration item related to finding materials within the VLE showed that 43.4% of the institutions have modified the interface so students are able to find materials easily. Some of the opinions regarding interface adjustment are shown below:

"We've created a standard course that is backed up by comprehensive organizational and language formats. Every subject matters and the work of teachers fully comply with this standard framework."

"We've adopted a standard format that provides students with full course content, allowing them to easily locate activities and readings: - Folder: Library - mandatory/further reading - Forum "answering questions" - Book - content addressed objectively and dialogically. All the courses use this standard."

"Our goal is to provide teachers with a pre-defined layout, which allocates an specific location for each resource and activity."

Although Moodle has been frequently used by many institutions, it was observed that the way to configure functional and non-functional features vary according to the environment, which reinforces the need for training so that institutions associated with Rede e-Tec Brazil explore VLE utilization in order to meet student demands.

5 PERIODIC MOODLE EVALUATION CONDUCTED BY STUDENTS

Moodle is evaluated by students at the end of each school year, considering they use VLE for specific subjects, exploring every learning and discussion capabilities the system has to offer. Table 1 shows an overview of student evaluation of VLE by semester.

Table 1. Periodic Moodle evaluation – by students

Rate Moodle according to its features: accessibility, agility, news mural, chat, and forum participation.					
Evaluated period	Total number of students	General evaluation (%)			
		Appropriate	Partially appropriate	Not satisfied	Did not know
2013/2	4,528	64.3	22.5	6.3	7.0
2014/1	11,279	60.5	23.3	7.4	8,9
2014/2	10,544	61.4	21.7	6.5	10.4
2015/1	11,679	62.9	21.5	5.6	10.0
2015/2	9,154	59.9	23.3	6.8	10.00
2016/1	9,003	62.7	22.2	6.0	9.1

It is observed that, on average, 62% of students have provided a positive overall evaluation of Moodle, if considered as the appropriate VLE. This evaluation revealed different aspects, such as functional and non-functional resources, as shown in Figure 2.

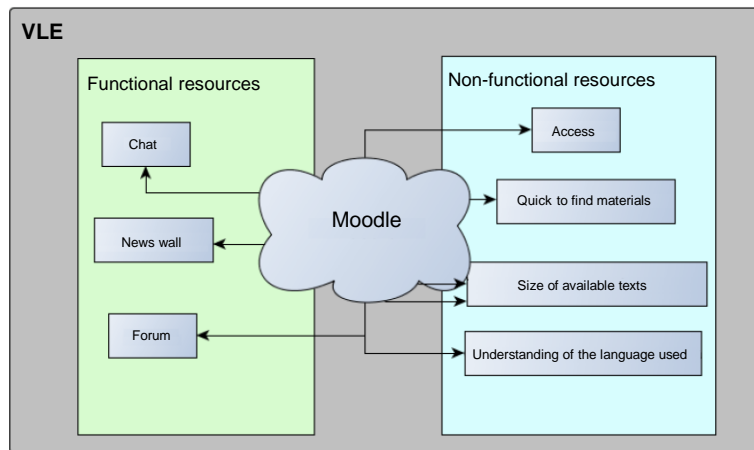


Figure 2. Functional and non-functional VLE resources evaluated

Accessibility, speed to find materials, and understanding of the language used have received a satisfactory evaluation for both semesters; yet these same aspects have shown weaknesses in the last three evaluations.

5.1 Non-functional resources

Figure 3 shows VLE non-functional resources evaluation line graph, evaluated per semester.

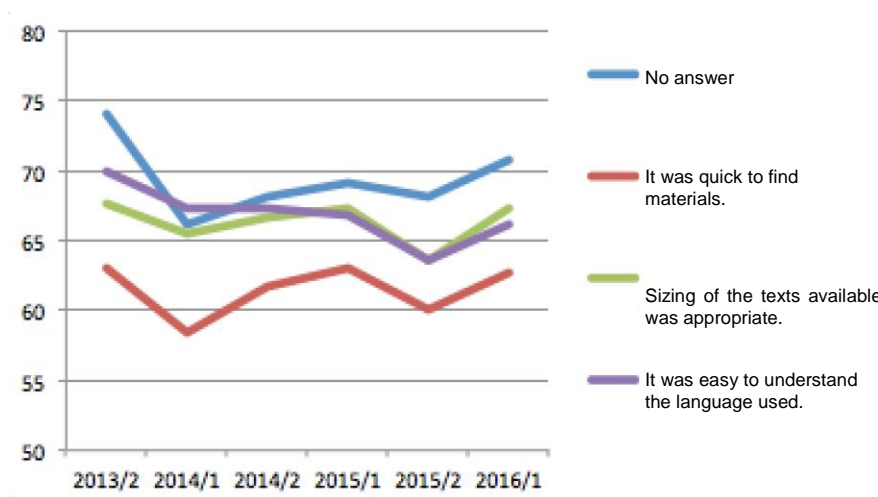


Figure 3. Non-functional Moodle resources evaluated by students

Accessibility, speed to find materials, and understanding of the language used have received a satisfactory evaluation for both semesters; yet these same aspects have shown weaknesses in the last three evaluations. Figure 4 shows VLE functional resources, rated per semester.

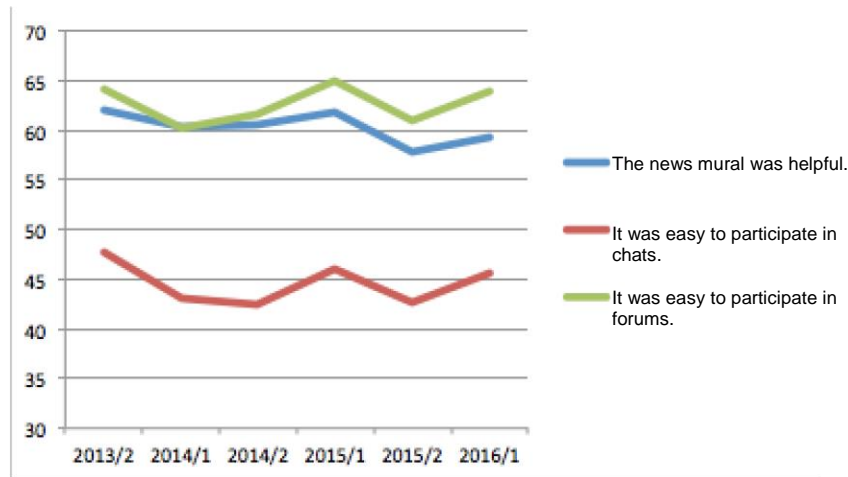


Figure 4. Functional Moodle resources evaluated by students

The evaluation of participation in VLE forums, as well as the usefulness of the news mural, remained satisfactory for both semesters. The chat tool has always been a functional resource, but its evaluation has fallen far below average; an indication that its configuration, utilization, and programming deserve remedial attention.

Regarding VLE non-functional resources, it is important to observe how easy materials are available on the VLE interface. Most students understand that finding materials is not an immediate process. In other words, it is important to implement a standard format that facilitates the organization of different resources and content within each Moodle course, allowing, for instance, material identification through common course topics that use a template designed specifically for Moodle courses.

Moreover, it is observed that students have had difficulties with font size. This evaluation consists of important information and must be reviewed by teachers and educational teams. In addition, Moodle administrators must consider a font size template for each course space.

5.2 Functional resources

Regarding VLE functional resources, it is important to observe that 22.2% of students considered news wall partly useful. According to the Moodle's Manual (2016), the news wall is a space normally intended to post notes or any other relevant information throughout the length of the course. These numbers led researchers to conclude that the news mural is not serving its purpose. Teachers and course administrators are capable of encouraging the use of the news wall by sharing important information and news routinely.

The chat tool has always been considered a "bottleneck" during the evaluation of VLE resources. It is still the feature that presents the highest rate of dissatisfaction among those questioned. In addition, about 38% of students believe that this item meets only "partly" or "not at all" their needs.

Of the total respondents, almost half of the students consider not easy to engage in chat rooms, and this result does not vary significantly between the second semester of 2013 and the first semester of 2016 (Figure 3). This is a strong indication that the interaction chat needs to be reviewed and improved, or better adjusted, pedagogically speaking; which may include VLE implementation issues, as well as the need for student, teachers, and tutors to undergo applicable training in order to utilize this feature in a more organized and well planned manner.

To better exploit this item, a deeper observation is necessary. This overall dissatisfaction is presumably not limited only to technological issues. The use of chat rooms must be analyzed in line with the educational purpose for which it was developed. Figure 5 shows an overview of the chat evaluation provided by 45 institutions distributed across 773 hubs, in the first semester of 2016.

It was easy to participate in chats.



- Yes
- Partly
- No
- Does not know
- Doubt
- No answer

Figure 5. Student evaluation of VLE conducted at 773 hubs

Figure 4 shows, in green, hubs where most students declared that the use of chat is adequate and serves its purposes. Yellow indicates that the use of chat at that particular hub deserves attention; red demonstrates that the chat tool is not easy to use and needs to be urgently reviewed.

5.3 Difficulties faced by students

It is necessary to assess the perceptions of those students who reported difficulties within the pedagogical management and infrastructure scope. Some of the answers given to open questions regarding the use of Moodle are shown below:

"Chats would not register remarks, due to technical issues with the system. Again, there was a delay until the instructor could answer a question; and the answer would only appear in the last few minutes of the chat session."

"The problem lays upon the chat itself. When too many participants log in, connection problems usually occur."

"The chat is terrible, sometimes we post something and the same post is repeated several times..."

"Moodle is very slow when it gets overloaded. A better version must be installed."

"The first attempts to access the chat usually fail, and when I post something in the forum, it takes too long to register."

"In order to improve the Moodle virtual environment, chat participation is extremely relevant, something that never happens."

"Up until now, chats were not offered for 1st module. The forum is underutilized. The teacher should enter course related questions in order to promote debate and expose individual ideas, which would contribute to collective interest in research and facilitate student interaction."

Most of the Moodle pedagogical resources reveal that the actions intended to improve student satisfaction, if ever implemented, seem not to have achieved their goals. The latest evaluations have shown a decrease in satisfaction. This inertia also affects the use of chat rooms, which revealed the lowest percentage, as far as satisfaction is concerned. These results urge managers and administrators

responsible for the implementation of distance learning courses to identify shortcomings and weaknesses of current VLE resources.

6 FINAL CONSIDERATIONS

Considering Moodle is a non-proprietary, virtual environment, widely used as an Educational Software (ES) that contributes to the courses offered by Brazilian public institutions, these results may substantiate not only the consolidation and improvement of Virtual Learning Environment software Learning, but also the need for better utilization of the resources currently available.

Resources such as chat rooms must be pedagogically appropriate to accommodate user needs, as they should incite students rather than create anxiety. In other words, student participation must be stimulated from the moment they log in, in addition to exploring mutual interaction in a very enriching manner.

The news wall must fulfill its intended purpose. It is important that its content is well sequenced and easily laid out so that the technical resources implemented to suit the visual design are explored instructively and informatively.

The interface refers to usability issues, which may include a number of features, such as font size, layout of icons, buttons, and links. It is important that the visual structure is well designed, allowing users to easily find functions and information.

The forum is a VLE resource that has received positive evaluation so far, but the efforts to maximize its adequacy and utilization must be continuous.

Finally, it is concluded that the continuous training of Moodle managers is imperative, considering that many of its features are not properly used and explored.

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