Evaluation of Data Processing Productivity for a Distance Learning Lato Sensu Graduate Course provided by UNASUS/UFMA using the Monitoring System (MonSyns)

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Abstract—**Distance Learning Courses are supported by technological tools that compensate for certain limitations, such as distance itself, temporality and emotional issues, among others. Distance Learning Courses must provide adequate Virtual Learning Environments in order for the students to have access to proper support during their learning process. The work can be justified as the monitoring teams need to process the course information stored via Moodle. Although the information is located in a single data bank, data recovery for students and tutors' monitoring is difficult. The research objective is to evaluate productivity on students' information processing on Moodle under the surveillance of the Monitoring Supervision Board of UNASUS/UFMA - Federal University of Maranhão. This evaluation is undertaken for a distance learning health-related graduate course using the Monitoring System (MonSys)of tutors and students. As a form of evaluation, the time spent by the UNASUS/UFMA monitoring team technician in order toprocess information through MonSys was compared to the time spent to recover information from MonSys. The Monitoring System brings out the opportunity to monitor students and tutorsin Moodle - Virtual Learning Environment in a quick, online way requiring less efforts from the monitoring team to generate useful information aiming at a greater course control and its satisfactory progress. According to the results, the reduction of the time spent by the monitoring teamand a consequentlybetter supervision of students and tutors' access and performance in postgraduate studies were significant to the demands of UNASUS/UFMA.**

Index Terms—**Virtual Learning Environment, Moodle, Monitoring**

I. INTRODUCTION

Distance learning courses are supported by technological tools that compensate for certain limitations, such as distance itself, temporality and emotional issues, among others. It is important to a Distance Education course to be provided with a suitable Virtual Learning Environment - VLE to support students' teaching-learning process.

The most used VLE is Moodle, which provides numerous features and activities to be used in the process of teaching-learning, not only in traditional learning system, but also in the distance learning one. According to the use and access of students, tutors and teachers in Moodle, data is stored and turned into information source that can be used to manage such elements of Distance Education courses (DE) according to the specific needs of each educational institution. However, this data remains scattered throughout the Moodle pages, demanding greater time and effort from the technical team in order to monitor the data during the courses.

The work can be justified as the monitoring teams need to process course information stored via Moodle. Although the information is located in a single data bank, data recovery for students and tutors' monitoring is rather difficult.

The objective is to evaluate students' data processing productivity while using Moodle under the surveillance of the Monitoring Supervision of UNASUS/UFMA - Federal University of Maranhão. The work is justified by the need of monitoring teams in processing information stored via Moodle, which, despite being in a single database, generates difficulty in information recovery for the monitoring of students and tutors. To do so, an initial and comprehensive context about the conceptual issues is necessary.

Distance Learning Education courses can be defined as a "teacher-student relationship or pedagogically mediated teaching-learning, through several instruction materials and by tutorial orientation. This applies not only to traditional teaching environment, but also to those in use of new technologies".[1] Distance learning education presents specific traits that breaks the conception of presence in the teaching-learning process. Under such perspective, the pedagogical act is no longer centered on the teacher, nor based on the assumption that the learning process can only take place if both elements, the student and the teacher, are face to face.

It is based on the fact that the teaching-learning process can be understood as the search for "an autonomous, independent learning, in which the student becomes the subject of his/her own learning and the core of the whole system". [1]

Moran[2] characterizes the distance learning education as a technology mediated teaching-learning process, in which teachers and students are not in the same place, at the same time.

Bentes [3] highlights, symbolically, the components of this learning modality at the tips of a star in order to help the understanding. They relate to one another through the aid of ICTs – Information and Communication Technologies, allowing the functioning of this education process, the conquering and the securing, a position in the education field, causing the desired success to be achieved (Fig. 1). That means that a star with less than five points cannot shine, cannot exist.
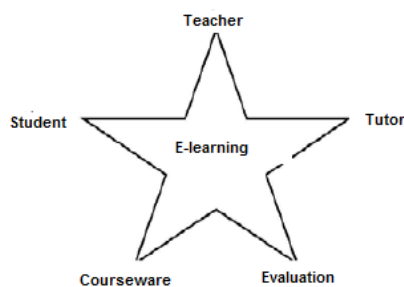

Figure 1. The components of e-learning Source: Bentes. (apud IAHN, 2002).

So that all the components are integrated and are able to play their role in a suitable way, several ICTs are used in distance learning education. One of them is the Virtual Learning Environmet – VLE, which enables the development of activities in time, space and pace in a more flexible way. It provides teachers and tutors with the possibility of creating and conducting distance learning courses, through activities that require students' actions, such as consulting materials, evaluation and training activities according to the syllabus. It is composed of several tools that allow the publication, interaction, and evaluation of resources and activities in teaching-learning process, as E-books, Labels, Wikis, Chats, Forums, Diary, Quiz, Tasks, among others.

Ribeiro[4], also states that VLEs:

"[..] provide participants with tools to be used during the course so as to facilitate file sharing of studying material, collection and review of tasks, discussion holdings, grade recording, promote student interaction, among other features. They contribute for the better improvement of education and learning."

In spite of the great quantity of tools on VLE, a lot of data need to be processed into information, which consumes a great deal of time and work from a technical team that cooperates with a course supervision. The efforts are focused on monitoring students and tutors, such monitoring is indispensable for the investigation of limit situations and advances in teaching and learning concerning Distance Learning course environments.

Monitoring, from a pedagogic point of view, demands that the progress of the activities be systematically followed, according to the objectives and central concepts. "Reporting creation allows all the gathered information to be used in decision making for the improvement of students' performance." [5]

In order to measure the VLE data processing and also help monitoring students and tutors, an analysis of Time is required. According to Slack, N., Chambers, S. and Johnston, R.[6], Time Study is a work measurement technique for recording the time and the rates of working for the elements of a specific job, carried out under specific conditions, to analyse the data so as to obtain the time necessary to carry out the work of a defined level of performance.

One of the ways to measure production is through timing. According to Xavier and Silva Sena [7], timing determines the amount of time needed to perform an operation, measuring the time spent in its elementary operations.

As believed by Barnes [8], when the execution time is determined one should take into account the speed at which the operator or technician is performing in operation. The normal time is formulated according to Fig. 2:

$$TN = TC \times v$$

Figure 2. Barnes formula

where: TN = Normal Time (*Tempo Normal*)
TC = Measured Time (*Tempo Cronometrado*)
v = Operator Speed (*Velocidade do Operador*)

The Monitoring System (MonSys) was developed in the PHP language with Mysql Database and it uses Moodle database tables to recover the necessary information to track and monitor the activities of students and tutors.

MonSys aims not only at monitoring the performance of the tutors, but also the activities of the students in Moodle, in accordance with the parameters established by the Monitoring Supervision of UNASUS/UFMA, such as the access of tutors and students, student grades, non-graded activities assigned by the tutors, and activities that were not posted by the students. There is only one kind of user in MonSys, the technicians who track and monitor the students and tutors in the VLE.

Course Module: it is the area to manage the information on courses and their respective disciplines

(classrooms) in the VLE. In this module the user will be able to:

- Visualize the disciplines (number of students, starting dates, status, closing dates).
- Obtain discipline summary (starting dates, number of ratings, number of accesses, average of accesses).
- Obtain student grades in disciplines;
- Visualize access of Tutors in the disciplines according to the number of specified days;
- Visualize the access of Students in the discipline, according to the number of specified days;

As it can be seen in Fig. 3 below, the Course Module lists the registered classrooms and it presents a summary of the information, such as classroom names, number of students, starting dates, the student status, if on or offline, and the projected closing date.

Figure 3. Course module that shows the classrooms.

When users click on the classroom, it's possible to visualize the discipline or course summary in a virtual Moodle classroom, and information such as Starting Date, Number of Students, Number of Tests, Number of Accesses and the average of accesses since the classroom was open (Fig. 4).

Figure 4. Course module. View of information summary of a course of discipline in a virtual moodle classroom.

Besides the summary, in this module, users have four tabs to visualize information on this course or discipline in a virtual *Moodle* classroom, as seen in Fig. 4, which presents the student grades concerning all the activities in the course or discipline. An important detail to be observed is the fact that we use an occult activity for the registration of the classroom evaluation and the *Moodle* calculator for the final grade processing of all students. The online activities account for 40% of the grade, while the classroom evaluation accounts for 60%.

On the tab Tutor - Access (*Tutor-Acesso)*, users can find an option that lists all the tutors according to the numbers of days they are far from Moodle. MonSys users can configure the number of days according to their needs (Fig. 5).

Figure 5. Course module .view of tutor. Access tab

The Tutor - Activities (*Tutor-Atividades*) tab lists the Tutors that did not evaluate none of the activities in the *Moodle* classroom (Fig. 6).

Figure 6. Course module. View of tutor. Activities tab.

Finally, in the Course Module, on the Student-Access (*Aluno - Acesso)* tab , users can find a list of Students based on their accesses according to the number of days that a student has not accessed *Moodle*. MonSys users can configure the number of days according to their needs. (Fig. 7).

Figure 7. Course module. View of student. Access tab.

User Module: MonSys area for listing *Moodle* user's names and logins.

Note Module: area for configuring notes to students and/or tutors who have not accessed the VLE for a certain period of days. In this mode users can::

- Create, alter, visualize and delete notes;
- Activate or Deactivate notes;
- Specify the number of days without accesses and the messages that will be sent to tutors and/or students;

Configuration Module: area for configuring MonSys parameters (Figure 9). In this module users can:

- On the General *(geral)* tab - define the site general parameters, e-mail and SMTP provider for sending e-mails via Note Module;

II. Materials and Methods

The UNASUS Monitoring Supervision board of Federal University of Maranhão has been used as a VLE and Monitoring System research tool. The MonSys has been developed by the UNASUS/UFMA Information Technology Team.

UNASUS/UFMA has two active health-related courses counting 46 tutors and 1390 students. The courses are spread over 15 support centers in Maranhão, a State in Brazil..

The method suggested by Slack, N., Chambers, S. and Johnson as previously described, was used for monitoring the processing time.

A pilot study with a UNASUS/UFMA Monitoring Supervision team technician has been conducted in order to generate preliminary results. The work has been done in one of the distance learning health related graduate courses. The mentioned course is in the sixth module, it holds 590 students and 19 tutors. It is available in the UNASUS/UFMA Virtual Learning Environment, it uses a one-room structure for each module and the VLE group feature for dividing the work among the tutors.

Task execution has been timed for time evaluation, as presented by Barnes, it has shown normal time calculation, according to the speed of the Monitoring team technician. In this research, only one technician was used, thus, it was not necessary to compare his speed and knowledge with any other professional.

For a one week period in June 2012, specific measurements have been undertaken , monitoring the time spent by the UNASUS/UFMA monitoring team technician on student information processing , via VLE, measuring the normal time for the execution of activities.

Later on, during another week, it was timed the time spent by the same UNASUS / UFMA monitoring technician to do the processing of the student information, via Monitoring System - MonSys. The same physical environment, as well as hardware and software were used for this study.

III. Results

As an outcome, it was obtained the times of measurement regarding the specific steps undertaken. Using VLE (Moodle), the obtained times were 21m53s for processing the information regarding "student access to Module 6 (Activity A)"and 44m18s referring to the "sending of activities of Module 3 (Activity B)". Using the Monitoring System (MonSys), the measured times were 09m51s and 17m21s.

There was a comparison between the tools used for collecting data, in which was possible to observe a reduction of time processing concerning the Monitoring System (MonSys) when compared to Moodle. It was possible to notice a reduction of 54,99 % of the time spent on data collection of the variable "Activity A" and a reduction of 60,9 % regarding "Activity B."

IV. Conclusion

It goes without saying that MonSys brings the possibility to monitor and track students and tutors inside the courses in the Moodle Virtual learning Environment, in a fast and virtual way. It requires less effort concerning the monitoring team when it comes to generating useful information so as to improve and enhance the course results.

According to the presented outcomes, the reduction of time spent by monitoring team, as well as the greater access track and student performance, concerning the postgraduate courses, were expressive stepping up UNASUS/UFMA demands.

As future work, we have the implementation of MonSys new functions, in order to meet the Monitoring Supervision needs, new statistical analysis concerning different situations on time spent to recover student information and the impact of Monsys when it comes to control UNASUS/UFMA student's dropout rate.

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