IT or not to be: The impact of Moodle in the education of developing countries

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Abstract

In this paper we show how Moodle can be used to improve the quality of education in developing countries and, even more important, how can be used to turn the educational system more sustainable and effective in the long-term. We describe our experience in implementing a programming course in Moodle for the Higher School of Informatics at the Université Polytechnique de Bobo-Dioulasso, in Burkina Faso (West Africa), joining efforts with local professors in designing and implementing the learning system. We finally discuss how the teaching effort is reduced, the students' knowledge and capacity improves, and the institutional academic model can be guaranteed with the proposal. For this reason, we claim that information technologies in developing countries are a cost-effective way to guarantee the objectives originally defined in the academic curricula and, therefore, deal with the problem of the education.

Introduction

Recent years have witnessed considerable enthusiasm regarding the role of information technologies (IT) in addressing educational challenges in Asia (UNESCO, 2004) and in Africa (Unwin, 2008). Although there are few experiences to develop online courses to support blended learning in developing countries (e.g. Sife et al., 2007), there has been limited opportunity to gather data regarding the state of e-learning in this continent. (Andersson, 2010) presents a framework of e-learning enablers and disablers to identify the major challenges for e-learning in developing countries. It seems that in developing countries, learning management systems (LMS) could be used to offer a real opportunity to stabilize the educational system at a very low cost. As a real example, a cooperation project between the Universitat Politècnica de Catalunya (UPC BarcelonaTech) in Barcelona, Spain, and the Université Polytechnique de Bobo-Dioulasso (UPB) in Burkina Faso, is described in this paper, implementing on Moodle a computer programming course for the computer science engineering degree. The process of adopting Moodle as LMS at the UPB seeks to solve specific problems: massive classes, lack of lecturers, excessive teaching hours for lecturers, coordination difficulties, and lags in studies for lack of teachers, to name a few.

Case study: Implementation of a first year programming course

1. Current course organization

In an instruction unit, the working time of a student can be organized in several parts:

- Classroom lecture (CM, le Cours Magistral en présentiel);
- Problems (TD, les Travaux Dirigés en présentiel); and
- Work practices (TP, les Travaux Pratiques en présentiel); and
- Personal student work (TPE, le Travail Personnel de l'Étudiant).

Problems (TD) are interactive sessions. Before a TD class, a list of exercises is provided to the students and, during the TD class, the exercises are corrected with the students' participation. Work practice (TP) sessions consist in giving the students a practical subject matter. The teacher in charge of the laboratory must be

physically present to provide guidance and to make sure students really work. Unfortunately, teachers do not always have sufficient time to follow the evolution of the work done by each student. Personal student work (TPE) represents a significant fraction of the total working time for each unit, being in theory close to 40%. However, the real situation is that TPE time is not devoted for the purpose assigned to it. In practice, all activities are conducted without regard to the personal student work, so there is a loss of 40% in the development of the instruction unit.
In addition, the lack of teaching resources and materials, such as video projector, or text books, slides, or even photocopies, causes huge waste of time. The lecturing task requires an oral dictation (DO, le Dicté Orale) in order to give as much formal information and detail to the students. The DO phase, on average, takes one third of the total time devoted to lecture. So this time, together with the TPE time, represent a sharp loss for the teacher and students times that, ideally, could have been leveraged to do more activities. As a consequence, there is not only a lack of teachers, but the time devoted by each of them to lecturing is highly inefficient. From the student point of view, beyond the lack of optimization of their working time, the training is incomplete, frustrating, and they do not receive any feedback for the activities eventually performed outside the class.

2. Opportunities with Moodle

Innovate in education does not always requires large amounts of resources. A LMS, such a Moodle, can be used through a local network. In addition, even though Moodle implements a large number of functionalities, only a reduced number of them are required to fulfil the objectives of our project. Services that can be of interest are:

- Course materials repository, available anytime, anywhere, although with the tight limitation that it will only be inside the campus area;
- Course organization, so that students will know exactly the type of activity and the amount of time to devote to the studying of each course module;
- Communication utilities, to allow collaboration between students and facilitate the interaction between students and lecturers;
- Assessment utilities, so that assessment can be carried out more often, the students can receive instant feedback and, in addition, the correction process by the teacher can be performed automatically.

Creating course materials and adapting them into a self-contained format can be a time consuming task. However, this effort will be transferable and reusable and, therefore, pays-off the invested time. The scheduling of course activities and associated times is a task that requires accuracy, ensuring that the time devoted to each concept is proportional to its contribution to the course objectives. However, one of the most important tasks to be performed is to wisely select the activities to be performed and the assessment mechanisms to be applied. Moodle offers several options to support the assessment process. For instance, keeping a repository of questions of different types (test, multiple-choice, exact text answer, and others) for each subject module allows the lecturer to choose each course a set of questions to be used for assessment.

3. New course implementation

A fist year programming course has been implemented, using Moodle in a local network, and only using a reduced set of its functionalities. To ensure the success of this integration into Moodle, the implementation has to be tested for several semesters and tuned according to the eventual gaps and deviations. Meanwhile, a preliminary analysis of the expected teacher and student workloads can be made.
According to the former course implementation, the time spend in each type of activity (as described in subsection 1) in some typical weeks during the course can be seen in figure 1. For each regular week, there are 1,5 hours for oral dictation (DO), 2,5 hours for classroom lecture (CM) and 2 hours for problems (TD). Some often, there is a week where a 3 hours evaluation (EV) takes place.

Figure 1: Typical course workloads

Figure 2 shows the accumulated time for each of these activities in a whole semester. These times are the same for both lecturers and students, because all activities carried out by the students need the participation, or assistance, of a lecturer. Note that, as discussed in section subsection 1, the personal student work time (40% of the expected time) has been excluded from the planning, as it was observed students do not spend any time in it.

Figure 2: Course workloads for a semester

The new planning for the proposed course implementation can be seen in figure 3. The upper figure corresponds to the lecturer workloads, and the lower figure corresponds to the student workloads. Notice that the oral dictation time (DO) disappears from the planning. Instead, the student can devote the same time to: read (not copying) the documentation and, therefore, pay attention to the concepts comprehension, and start doing some work practices (TP) what is a substantial qualitative improvement. From the lecturer point of view, the workload has been greatly reduced.

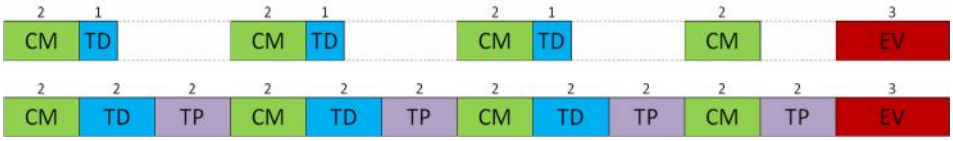

Figure 3: New course workloads

Figure 4 shows the accumulated workloads for both, lecturers (up) and students (down), with the new course implementation. The professor time is concentrated in lecturing, clarifying concepts and organizing classroom problems, leaving some time for personal student's activities. The total professor lecturing time has been significantly reduced by about 50%. As discussed earlier, this time could be used to improve and update the course contents and, additionally, have some time to devote to other academic tasks. With respect to the student's workloads, even though the total time is very similar to the former course organization, the type of activities are more interesting academically and, therefore, the learning process will be more efficient.

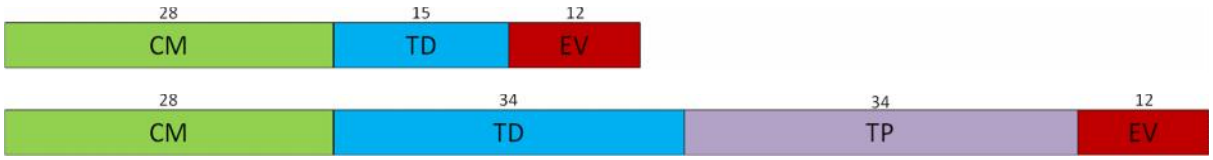

Figure 4: New course workloads for a semester

Expected benefits

The process of adopting Moodle as LMS at the Université Polytechnique de Bobo-Dioulasso does not seek to create a more democratic and participatory learning process and synergies of cultural transformation; it just wants to solve specific problems: massive classes, lack of lecturers, excessive teaching hours for lecturers, coordination difficulties, lags in studies for lack of teachers, to name a few. In the future, it may also catalyse changes, but today this is not their goal. The expected benefits of this project are:

1. Students

Quantity of contents

The main problem with teaching material in developing countries is the accessibility to it, or lack thereof. Having all the information online (even locally in the campus internal network) would be an important timesaver for all, and will provide students with a wealth of contents that they could not have access before.

Quality of contents

The digitalization of all the teaching resources into the LMS will drive a quality control process that will greatly benefit students. A lot of the teaching material used in developing countries has remained stagnant for a number of years due to different reasons. We believe that the process of content digitalization, coupled with the wealth of material freely available for most LMS on the Internet, will help increase the quality of the offered courses.

Easy of access

Contrary to developed countries where access to the Internet is granted, the majority of the students from developing countries face important connectivity limitations. Having an LMS complete with courses and teaching material at the university campus would provide all the necessary resources needed by the students and would facilitate access to a much more important amount of information.

Practical activities

LMS provide a wide array of practical activities such as quizzes, workshops, assignments and forums that can be incorporated in the courses. This aspect is very important for developing countries as the education system tends to be a lot more practically oriented than in developed countries. In addition, the LMS will allow the

performance of new and more dynamic activities, including group work and cooperation. The students will be able to share and discuss exercises, experiences, works, and so on.

Novelty

Finally, the novelty of the digital teaching process will be in itself a strong incentive for the students to dedicate time to their studies, navigating the LMS and accessing all available content. For this reason, it is important to strive for a complete implementation of the LMS taking advantage of as many features as possible, capturing their interest and helping them to take advantage of everything that is offered.

2. Lecturers

Reduced effort

Porting a course to an LMS requires some extra work for the digitalization and the adaptation of the contents to the new format, but this task has to be done only once. In addition, the time and attention required by the lecturer is greatly reduced. Quizzes and tests can be automatically generated from a pool of questions, activities can be carried out by the learners with minimal supervision and in many cases the existence of an LMS would enable the lecturers to engage in distance learning if they are unable to attend the class personally. This saved time can be invested in other activities like research, or further self-education.

Quality improvement

The digitalization of all the teaching resources will drive a quality control process in the course documentation. In addition, the existence of an important number of courses available freely from many institutions online, along with the ease of organization an LMS inherently provides, will help the lecturers raise the quality of their courses by using new teaching material that would otherwise be complicated for them to get their hands on. Having more sources on which to base their courses, as well as a point of quality reference, will help them build their courses at a level that will be on par with the courses taught in developed countries.

3. Management and organization

The existence of an LMS guarantees some level of organization for the courses taught at a school or institution. The course format can be easily defined and controlled, courses end up being better formatted and most importantly, the course is always there available for teaching, even when the professor is unable to attend. This last point is particularly important according to our experience offering teaching assistance at the UPB. Due to their lack of teaching staff, they are heavily dependent on visiting professors to fill the curriculum. However, there is no guarantee that a certain professor will be able to visit every single year to give the same course. This obviously introduces a lot of teaching inconsistencies among students of different years, since courses available each year may vary. Having a course setup at the LMS can provide a lot of stability in that regard, since it will be a lot easier for a different professor to teach it with a minor amount of preparation or, in the future, use distant learning to complement some parts of a course when the teacher is not available.
It is also important to stress that an LMS is not only a platform for having digitized courses on a server accessible over a network. LMSs are potent management tools that can be used to take care of human resources management, wages, curriculum organization and other management task that could greatly benefit any learning institution.

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