eleed
e-learning
& education

Issue 8
2011

Using Moodle as a support tool for teaching in Higher Education in Portugal: an exploratory study

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urn:nbn:de:0009-5-31613

Abstract

The use of virtual learning environments in Higher Education (HE) has been growing in Portugal, driven by the Bologna Process. An example is the use of Learning Management Systems (LMS) that translates an opportunity to leverage the use of technological advances in the educational process. The progress of information and communication technologies (ICT) coupled with the great development of Internet has brought significant challenges to educators that require a thorough knowledge of their implementation process.

These field notes present the results of a survey among teachers of a private HE institution in its use of Moodle as a tool to support face-to-face teaching.

A research methodology essentially of exploratory nature based on a questionnaire survey, supported by statistical treatment allowed to detect motivations, type of use and perceptions of teachers in relation to this kind of tool. The results showed that most teachers, by a narrow margin (58%), had not changed their pedagogical practice as a consequence of using Moodle. Among those that did 67% attended institutional internal training. Some of the results obtained suggest further investigation and provide guidelines to plan future internal training.

Keywords: e-learning; higher education; learning management system; Moodle

Background

The gradual integration of ICT in HE has proved a challenge and a research area in full growth. The progress of these technologies coupled with the great development of the Internet, have brought substantial challenges to educators. This Web development, from Web 1.0 to Web 2.0, is characterized by Downes as a change, "(...) in which information was transmitted and consumed, into being a platform, in which content was created, shared, remixed, repurposed, and passed along." (2005). So what is done now on the web is an interaction with all types of available resources.

The use of the Web 2.0 term has been constantly growing in several contexts, including academic, and gave rise to expressions such as E-learning 2.0 (Lencastre, Vieira & Ribeiro, 2007). This system of education and online learning has many advantages for schools.

Web-based training can be accessed by trainees at any location convenient to them. Maintenance of Web-based training programs is simplified as once changes are made on the web server, all trainees immediately access the updated or modified content automatically. Trainees also can specify the subject matter of interest and have it delivered right to their PC. (Curran, 2001, p. 2)

Among the new technologies that support online education we have the LMS also known as Course Management Systems (CMS). These have been adopted by HE institutions both as support to face-to-face and in distance learning. In Portugal, LMS's are increasingly used by universities, driven by the use of ICT, among other reasons, by the assumptions of the Bologna Process and the creation of the European HE Area (EHEA) as is well expressed in the conclusions of a recent European Union report:

As ICT use becomes more pervasive in people's lives, these issues should be explicitly addressed in teaching and learning. The potential of new technologies for enhancing innovation and creativity, new partnerships and for personalizing learning needs to be better exploited. (2010, p. 117/2)

The integration of ICT in the Portuguese education system conducted, in 2007, to the approval of the Technological Plan for Education. One of the main objectives was to "enhance and modernize the school, create physical conditions conducive to the achievement of students and consolidate the role of information and communication technologies (ICT) as a basic tool for learning and teaching in this new era." (Ministério da Educação, 2007, Trans., p. 6564)

It is in the structural axis of the contents that the Ministry of Education (ME) forecast the widespread use of LMS's, and it was in this sense that, coupled with the desire to promote the use of ICT in schools, the ME, through the Foundation for the National Scientific Computation (FCCN) and also the CRIE released to all schools a place to host a Moodle instance server at FCCN (2007). (Lisbôa, Jesus, Varela, Teixeira, & Coutinho, 2007, Trans., p. 45)

The adoption of technology is important in many aspects and

...a comprehensive infrastructure for learning is necessary to move us beyond the traditional model of educators and students in classrooms to a learning model that brings together teaching teams and students in classrooms, labs, libraries, museums, workplaces, and homes – anywhere in the world where people have access devices and an adequate Internet connection. An infrastructure for learning is necessary to support a learning society in which learning is life- long and life-wide. (Atkins et al., 2010, p. 51)

Among the most widely used open source LMS is Moodle, created by Martin Dougiamas in 2002 (release date for version 1.0) and is guided by the principles of social constructivist pedagogy.

The concepts behind this philosophy of learning are that learners actively construct new knowledge by tinkering, and they learn more by explaining what they have learned to others and by adopting a more subjective stance to the knowledge being created. These

ideas run parallel to the way open-source development works, in which the developers also often are users, everyone is free to tinker with the software and code is constructed, peer-reviewed and refined by the means of an open discussion. (Fairchild, 2010)

The strategic importance of these systems to educational institutions (Allen & Seaman, 2008) reinforces the need for knowledge about them to increase their effectiveness and efficiency.

Instructors need to understand the different components of the LMS and how these components will work to make the course effective and efficient. The LMS should be able to create pedagogically sound course content and learning objects easily and efficiently. It should have all the necessary e-learning tools for assessment, communication, collaboration, and community building, as well as for the creation and management of online learning courses. (Lewis et al., 2005, p. 26)

In this sense, Lencastre and Monteiro (2009), held in Portugal, a study involving teachers of a HE institution in which they planned, among other objectives, to assess new concepts, attitudes and approaches to the learning process by using the LMS Moodle. The same study emphasizes the importance of research on teaching and learning platforms.

The use of LMS has shown the potential of these systems and has become a field of research increasingly promising, with an increment number of studies, for example on usability, as referred by Inversin, Bottura and Triacca (2006):

Recent developments (Triacca et al., 2004; Frick et al., 2005) indicate that web usability is becoming an important issue for eLearning and for LMS development. A recent survey (Pulichino, 2004) shows that eLearning practitioners perceive usability a key factor in eLearning applications planning and use. The results of that survey indicate three aspects: (a) usability is an essential consideration when designing eLearning; (b) eLearning components should always be tested for usability; and (c) eLearning components effectiveness can be greatly enhanced through user-centered design methodologies. (p. 595)

During our research, we have acknowledged that there are only a few studies on the use of LMS's by HE teachers in our country so we expect that our investigation will be able to contribute with useful information for users and educational institutions in the process of using and implementing this kind of platforms.

Research Context

Instituto Piaget (IP), a university and polytechnic private institution with campuses in various parts of Portugal (one of these being the Almada Campus, where the study was carried out) and in other Portuguese speaking countries, has been investing in online education, which has proved of great importance given the transformation of HE due to the Bologna process undergone by Portugal (within Europe) since 2007. A Post-graduation on ICT was the first step, gradually extended to all campuses, beginning in 2005 on the Almada Campus. This course enabled the development of a group of trainers with expertise in this area and qualified to gain the experience which proved decisive in the further implementation of the Education Online Project throughout the institution. In this Post-graduation a LMS was first used as well as distance learning methodologies. Through

an agreement with PT Inovação (from Portugal Telecom), initially signed with the IP of Cape Verde, in the first editions of the Post-graduation the proprietary LMS Formare was used and replaced in December 2007 by the open source LMS Moodle, installed in the IP own servers (Lencastre & Monteiro, 2008, p. 5).

As of December 2007 began the Education Online Project, with the following purposes:

- Enhance the provision of IP in the use of ICT in teaching and learning.
- Support the creation of online educational content, both by providing a content management platform MOODLE and through personalized support, both technical and pedagogical.
- Promote the adoption of alternative educational paradigms supported by ICT.
- Promote online education to complement the teaching-learning processes in face-to-face classes.
- Promote differentiated teaching-learning methodologies either in face-to-face or as complement to face-to-face classes.
- Promote the development of products and services in ICT.
- Assess the effectiveness and efficiency of the introduction of ICT in the IP courses.
- Disseminate the institutional platform MOODLE in IP.
- Promote the integration of the platform Moodle with the school management system Sophia, who will manage all the administrative procedures of IP.
- Strengthen the IP as a MOODLE PARTNER, betting on appreciation of their services through a team of web designers, programmers, content producers, educators and project managers, that allow to provide innovative and quality services out of the institution. (Lencastre, 2007, Trans.)

Having selected Moodle, given its dissemination in the Portuguese primary and secondary schools (as well as in HE institutions), the technical aspects were ensured by a Technology Department that assured good conditions for the use of IP internal network, and a Help Desk was designed to offer specialized support (Lencastre & Monteiro, 2008).

In terms of pedagogical implementation on each campus, were appointed pivots of the project and selected teachers called pioneers or precursors, responsible for promoting and replicating the instructional processes with their colleagues and the academic community (Lencastre & Monteiro, 2008). The pivots and pioneers received internal training, first on technical and pedagogical use of Moodle (Moodle Workshop, January 2008) and later on The Use of the Moodle Platform in Pedagogical Context assuming the Bologna principles (March-May 2008), which focused on pedagogical changes implied by the Bologna Process and how to teach online and use Moodle for this purpose. From December to February of 2008 a training course called Project based Collaborative Learning, was focused on design methodologies and collaborative learning as teaching strategies for online education (Lencastre & Monteiro, 2009). All these courses were carried out using b-learning. From 2007 to 2009 there were also developed several internal face-to-face training sessions on Almada Campus aimed to develop teachers' skills in using the platform.

By 2008, except in the Post-graduation on ICT, the use of the LMS was limited to a support to face-to-face courses. In 2009, starts Piaget Online Project, which is characterized by the implementation of online courses in all Campuses, on a b-learning regime.

This study is part of a series of ongoing investigations being carried out by Almada Campus Piaget Online Support Team. There are presently three types of use of Moodle by teachers:

1. As a complement to face-to-face classes (not mandatory).
2. As b-learning on a percentage of teaching hours of Masters courses (mandatory).
3. As b-learning on online curricular units in courses in all Campuses (mandatory).

This study will focus only on the first type of use of Moodle, as a complement to face-to-face classes, that was a non mandatory use. That meant that the teachers in question started using the LMS by their own initiative and they were self-motivated. The fact that most of them showed early adopter tendencies was taken into account in the research results.

Methodology

For this exploratory study we collected data with an online survey questionnaire with the following purposes:

1. Ascertain reasons for the use of Moodle;
2. Identify effects that the use of Moodle had in teaching;
3. Characterize the use of resources and activities available in Moodle;
4. Identify perceptions of advantages and disadvantages of using Moodle.

Study population

We surveyed the 26 teachers who used Moodle as a complement to their face-to-face classes during the 2009/2010 school year and got 24 responses which represent a 92% response rate.

A pilot test of the questionnaire survey was conducted to ascertain its consistency and the definitive version was, after some minor reformulations, sent to all teachers involved in the study.

Implementation

We decided for a survey questionnaire developed using Google Forms which presents data in a spreadsheet and works with a web-based interface.

Type of questions	Percentage
Multiple Choice	19%
Direct response	30%
Open question	14%
Attitude Scale	37%

Table 1. Structure of the questionnaire survey

The survey questionnaire contained 37 questions separated like shown on table 2:

Subject	Percentage
Motivations	14%
Type of use	11%
Perceptions	48%
Subject Characterization	27%

Table 2. Different subjects of the survey questionnaire

The link to the survey questionnaire was e-mailed to all teachers who had 10 days to respond.

After data collection we proceeded to an elementary statistical treatment using descriptive statistics, and exploratory data analysis of several sub-groups such as sex, academic qualification, motivation, type of training and kind of employment contract with the institution.

Study limitations

The verification of changes in teaching practice through the use of technological tools, can only be verified through longitudinal studies. These changes can be influenced not only by the use of LMS but also by changes in technology itself and in the HE system. Bearing these limitations in mind, this first study will have to be compared to future ones to ascertain its conclusions.

One other main limitation of our study was related to dealing with different pedagogical strategies given the different modalities of teaching.

Analysis and discussion of results

In this section we analyze the results of the survey questionnaire applied in order to answer the questions of this study. The database was created with the Google docs spreadsheet and codified in OpenOffice.org Calc 3.2., where we conducted the analysis. The procedures were mainly of two types: descriptive statistics and exploratory data analysis. The results and it's discussion focused on three essential moments. At first, we gathered the results. A second phase we identified the type of use of the tools available in Moodle. The third phase focused on the most significant data provided by the analysis of the various sub-groups.

Teachers perceptions about the advantages and disadvantages of Moodle is shown in figure 1.

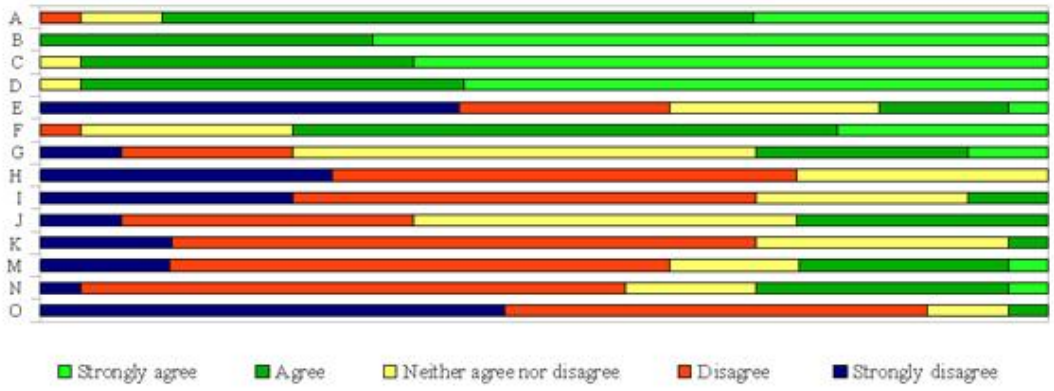

Figure 1. Perception of teachers on the use of Moodle.

A. Contact with students is facilitated through the use of synchronous and asynchronous tools (forums, chats, individual messages);
B. It is an excellent repository of various types of content (written, audio, video);
C. Work on Moodle from any location is a plus;
D. Work on Moodle at any time that is convenient to me is a plus;
E. Moodle it's not very useful for organizing my classes (e.g. through summaries, objectives and resources for each class);
F. Moodle is very useful to receive assignments from students;
G. Moodle helps me to save time in the organization of my classes;
H. Moodle has few resources and/or activities to meet the objectives that I propose in my classes;
I. Moodle makes the relationship between teacher and student impersonal;
J. Moodle is not very flexible in terms of structure;
K. Moodle is not very flexible in terms of the type of resources that may be uploaded;
M. Working with Moodle is difficult and/or complicated and requires specific technical skills;
N. The moodle appearance is unattractive;
O. Moodle has no educational use.

As strong points in the use of Moodle, teachers enhanced the following items:

- the fact that it is an excellent repository of multiple types of contents;
- being able to access the platform at any location;
- being able to work at any time;
- the fact that it is useful to get the students assignments;
- the fact that Moodle is useful for teaching.

As weaknesses in the use of Moodle teachers enhanced the following items:

- the need to have technical skills to work with Moodle;
- the fact that it does not have a very flexible structure;

It is somewhat strange that one teacher agreed with statement O. (Moodle has no educational use) (4%) as all of them were using it by their own choice. Possible explanations: it was not really his choice but some institutional influence that led him to use it and/or had some prejudice related to Moodle. Another possible explanation would be that he reached that conclusion after using Moodle.

In respect to the use of resources and activities available in Moodle we had the following results (table 3):

Reply	**Percentage**
To keep the resources of the Course organized and available for student access	22%
As a repository of content	20%
To communicate with students (through chats, forums and / or individual messages)	15%
To receive students' work	15%
To (support) activities in the classroom	11%
To (support) activities outside school hours	10%
For evaluation of students through the activities of the platform	6%
Other	1%

Table 3. Results to: How do you use Moodle in your courses?

These results support the idea that teachers use Moodle mainly to provide resources and, in a minor degree as a communication channel and a place to receive assignments. Although Moodle training provided teachers with the expertise to use all the main LMS features and although we were expecting teachers to use the technology to maximize their teaching and evaluating practices they didn't do it. A possible explanation may rely on the fact that most of them did not have extended prior experience.

In respect to which kind of resources they use in Moodle we had the following results (Figure 2):

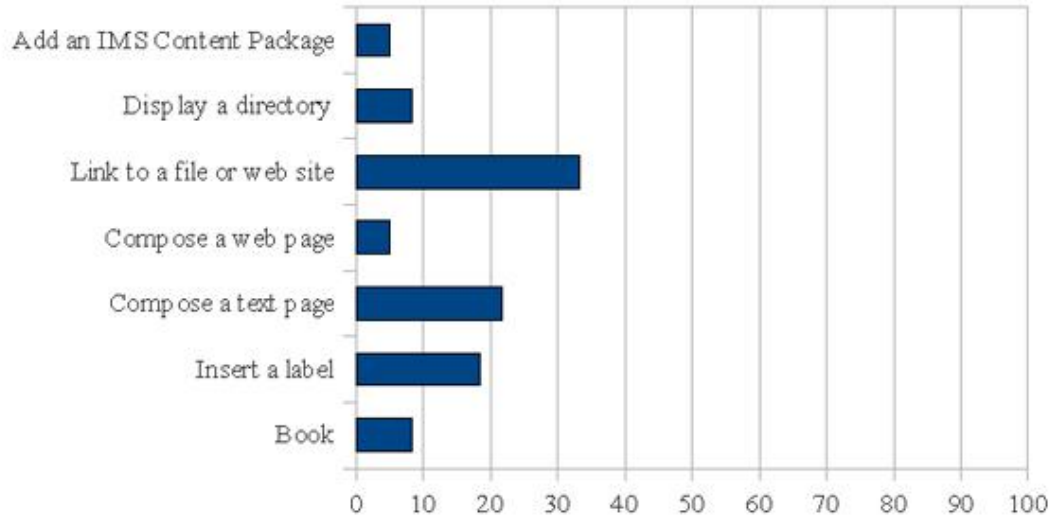

Figure 2. Results to: Which of the following resources of Moodle do you use?

In the analysis of the most frequently used resources, data point to an elementary use of Moodle as a way of distributing resources, patent in the 33% of responses on link to a file or web page (Figure 2). That is in line with the results of the previous question about the kind of Moodle usage. Near 20% used the Compose a text page and Insert a label resources usually associated with simple forms of communication or task presenting.

In respect to which kind of activities they used in Moodle we had the following results (Figure 3):

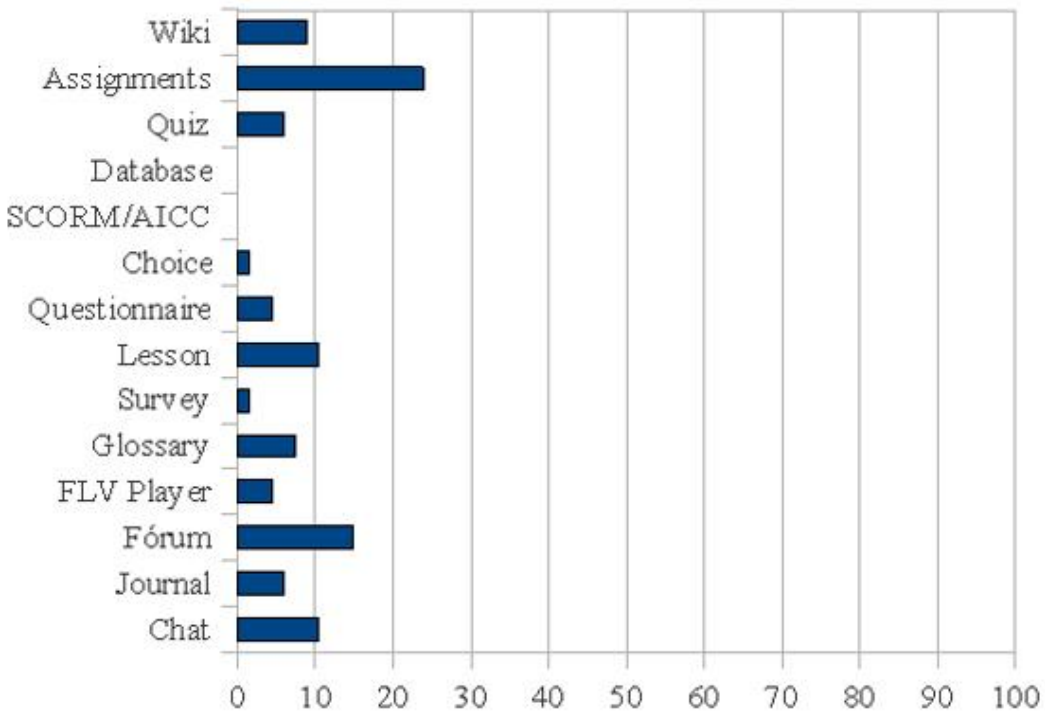

Figure 3. Results to: Which of the following Moodle activities do you use?

In the analysis of the activities most frequently used, once more results point to an elementary use, patent in the 24% score of the assignment (Figure 3). The 10% score on the Lesson activity raises some doubts and requires verification in future studies because it is a more complex activity not matching the teacher profile outlined and may be explainable by a not correct identification of which Moodle activity was referred.

The next figure compares the answers to the question Did you change pedagogical practice since you started using Moodle as a support tool? by items: Link to institution, Moodle Training, Motivation to use Moodle, Academic Degree and Gender.

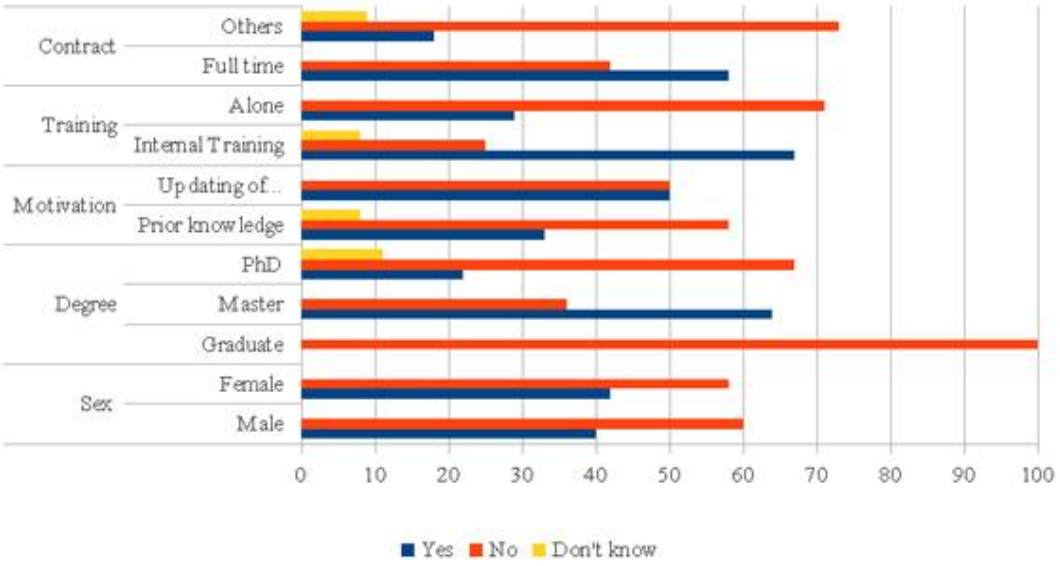

Figure 4. Bar graph comparing the answers to the question: Did you change pedagogical practice since you started using Moodle as a support tool?

From Figure 4 we can highlight the following data:

- The percentage of graduate lecturers that use the platform as a content repository is 40%;
  56% of PhD lecturers only started using the platform in this school year;
  55% of PhD lecturers skills were acquired by internal training;
- 67% of graduate lecturers learned by themselves;
- only 22% of PhD lecturers agree with the statement that Moodle favours impersonal relationship between teacher and student.
- 67% of the teachers who attended internal training said they had changed their practice (there were insufficient replies to the open question Q14.1. about the kind of change).

From the results we extracted a teacher-type profile:

- The teacher-type has between 31 and 40 years (50%), is a woman (54%), has a master's degree (46%), has a full time employment contract (54%) and has taught in HE for less than 15 years (67%).
- She already had experience of using Moodle as a teacher (54%) not being new users (67%), rates herself as good (51%) in the use of Moodle and as obtained her skills from internal training (30%) or from self-learning (38%) but did not alter her pedagogical practice by the use of the platform (58%).

- She uses Moodle in 60% of her courses because she had prior knowledge of this LMS (27%) and driven by the chance to update her teaching and learning methodologies (36%). Uses Moodle mostly as a repository of content (20%) and as a way to organize it (22%). Favors Scripto resources (59%) and uses mainly the forum (15%) and assignments (24%).

Conclusions

The introduction of technological tools in HE in Portugal has been driven by the ongoing process of renewal of the education system, due to the Bologna process. Although the use of these technologies places great emphasis on the autonomy of students' work, the process of their implementation depends in equal measure of their use by teachers. Therefore, in this exploratory study, we sought to ascertain the type of use and the perceptions that teachers have of Moodle as a tool to support a face-to-face classes. The main conclusions were:

- Most teachers use Moodle as a content repository;
- Most teachers have chosen to use Moodle looking to improve their teaching and learning methodologies, and because they had prior knowledge and experience;
- The most used resources were link to a file or website and compose a text page;
- The main activities used were: assignments and, to a lesser degree, forums;
- Most teachers say they have not changed their pedagogical practice;
- Most teachers who claim to have changed their practice received internal training.

Despite the context (Moodle early use) of our research, recent studies have been reaching similar conclusions about how Moodle is used (Jurado & Pettersson, 2011) . The results suggest the need for an intervention to make teachers improve their proficiency in using Moodle as a complement tool for teaching and explore new tools beyond the most frequent used. Data point to conclusions that lead us back to internal training and training plans that should favor more the Moodle features that contribute to interaction and online collaborative learning, because we believe that without them teachers are still not using fully the LMS technology to improve their teaching practice to meet new needs and challenges of HE in the 21st century.

As shown by the results of this exploratory study, changes to teaching practice came mainly from teachers with a master's degree and teachers who attended the training internally. We have no data to verify the degree of this change.

We believe that the kind of pedagogical change undertaken by these teachers needs a thorough study to understand its nature and thus to adapt the internal training that is being conducted by the institution.

This study, although being exploratory, is a good starting point and a diagnostic tool to institutional future actions by unveiling some teachers uses of Moodle. We hope that further research results in this ongoing study will be able to suggest lines of action and important features to change teachers' practices.

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Appendix A

Teacher's questionnaire

Q1. What is the reason that led you to opt for the use of Moodle?

1. *Prior knowledge of such platforms*
2. *Curiosity for this type of tool*
3. *Particular needs dependent on objectives and/or features (s) of taught Curricular Unit (s) or Course (s)*
4. *To update the teaching-learning methodologies*
5. *Other*

Q2. In how many courses did you use Moodle as a support tool in this school year?

Q3. How many courses have you taught, in this school year?

Q4. How do you use Moodle in your classroom?

1. *As a repository of content*
2. *For evaluation of students through the activities of the platform*
3. *To communicate with students (through chats, forums and / or individual messages)*
4. *To receive students' work*
5. *To keep the resources of my course organized and available for student access*
6. *To (support) activities outside school hours*
7. *To (support) activities in the classroom*
8. *Another*

Q4.1. Develop, if desired, the previous answer

Q5. Which of the following resources of Moodle do you use?

1. *Book*
2. *Insert a label*
3. *Compose a text page*
4. *Compose a web page*
5. *Link to a file or website*
6. *Display a directory*
7. *Add an IMS content package*

Q6. Which of the following activities of Moodle do you use?

1. *Chat*
2. *Journal*
3. *Forum*
4. *FLV player*
5. *Glossary*
6. *Survey*
7. *Lesson*
8. *Questionnaire*
9. *Choice*
10. *SCORM/AICC*
11. *Database*
12. *Quiz*
13. *Assignments*
14. *Wiki*

Q7. Which of the following types of resources do you use in Moodle?

1. *Scripto (text, etc …)*
2. *Audio (music, podcasts, etc …)*
3. *Video (Screencasts, videos, etc …)*
4. *Another*

Q8. Did you have previous experience in the use of Moodle prior to this year?

1. *Yes, as a student*
2. *Yes, as a teacher*

3. *Yes, as a student and teacher*
4. *No previous experience*
5. *Another*

Q9. Did you use Moodle in the last three years as a complement to your classes?

1. *Yes, during the academic year 2007/2008*
2. *Yes, during the academic year 2008/2009*
3. *Yes, in the academic years 2007/2008 and 2008/2009*
4. *No, only in this school year*

Q10. How would you rate your level of proficiency in using Moodle?

1. *Very weak*
2. *Weak*
3. *Elementary*
4. *Good*
5. *Very good*

Q11. How did you acquire the skills you currently have to use Moodle?

1. *Through internal training*
2. *Through external training*
3. *Taught myself*
4. *Through friends / acquaintances*
5. *Another*

Q11.1. Develop, if desired, the previous answer

O12. Read the following statements about Moodle and rate your degree of agreement with them.

Label:

1. *Strongly disagree*
2. *Disagree*
3. *Neither agree or disagree*
4. *Agree*
5. *Strongly agree*

Q12.1. Contact with students is facilitated through the use of synchronous and asynchronous tools (forums, chats, individual messages)

Q12.2. It is an excellent repository of various types of content (written, audio, video)

Q12.3. Work on Moodle from any location is a plus

Q12.4. Work on Moodle at any time that is convenient to me is a plus

Q12.5. Moodle it's not very useful for organizing my classes (e.g. through summaries, objectives and resources for each class)

Q12.6. Moodle is very useful to receive assignments from students

Q12.7. Moodle helps me to save time in the organization of my classes

Q12.8. Moodle has few resources and/or activities to meet the objectives that I propose in my classes

Q12.9. Moodle makes the relationship between teacher and student impersonal

Q12.10. Moodle is not very flexible in terms of structure

Q12.11. Moodle is not very flexible in terms of the type of resources that may be uploaded

Q12.12. Working with Moodle is difficult and/or complicated and requires specific technical skills

Q12.13. The moodle appearance is unattractive

Q12.14. Moodle has no educational use

Q13. Moodle allows me to quickly assess students using the tools provided

Q14. Did you change your teaching practice since the use of Moodle as a complementary tool?

1. *Yes*
2. *No*
3. *Do not know*

Q14.1. If you answered yes to the previous question, please indicate to what extent it is affecting your teaching practice?

C1. What is your Age?

C2. What's your Sex?

C3. What is your academic degree?

C4. What the kind of labour contract with the institution?

C5. For how many years do you teach in higher education?

C6. What are your graduation areas?

C7. What are the scientific ares in which you teach?