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*Moodle as a useful pervasive learning environment*¹

Moodle como um ambiente de aprendizagem amplo e útil

ABSTRACT - This study provides updated data on the evolution of *Moodle*, which was initially seen as an e-learning platform intended to become a pervasive learning environment (PLE) with its multiple possibilities for higher education students and teachers. An online anonymous survey has been administered to a sample of 100 students of different degrees, and 32 teachers of different subject areas to find out their perceptions on the usefulness and improvement of our virtual learning platform at the Universidad de Las Palmas de Gran Canaria (ULPGC), Spain. Results show that this Learning Management System (LMS) is still regarded as a motivating space to support face-to-face instruction, but it has also been pointed out that it encourages knowledge building, pervasive learning and constructive interaction among its participants.

Keywords: *Moodle*, e-learning, ICT, pervasive learning environment, higher education.

RESUMO - Este estudo apresenta dados atualizados sobre a evolução do Moodle, que foi inicialmente visto como uma plataforma de *e-learning* a tornar-se um ambiente de aprendizagem amplo (*Pervasive Learning Environment*), com suas múltiplas possibilidades para os estudantes do ensino superior e para os professores. Uma pesquisa anônima *on-line* foi realizada com 100 estudantes de diferentes graus e 32 professores de diferentes áreas, a fim de conhecer as suas opiniões sobre a utilidade e a melhoria da plataforma de aprendizagem virtual da Universidade de Las Palmas de Gran Canaria (ULPGC), Espanha. Os resultados mostram que esse Sistema de Gestão de Aprendizagem (SGA) ainda está sendo considerado como um recurso motivador para apoiar a instrução face a face. Contudo, também foi apontado que, atualmente, esse sistema incentiva a construção do conhecimento, a aprendizagem estendida e a interação construtiva entre os seus participantes.

Palavras-chave: *Moodle*, ICT, ambiente de aprendizagem estendida, educação superior.

Introduction

In present-day higher education, it is essential to note that a transformation is taking place. Nowadays, students are constantly exposed to Information and Communication Technology (ICT), so teachers must also adapt to current students' needs and interests, having digital resources in mind. The rapid development of these technologies, combined with access to content almost anywhere and anytime, allows learners to gain new experiences regarding learning in a variety of situations and not only in school settings.

According to Lucke and Rensing:

In education technological developments have had a strong impact on the behavior of learners and teachers as well as on learning and teaching scenarios. For instance, the availability

of digital content and a constant internet connection have led to a reduction in the relevance of traditional textbooks and the emergence of new kinds of cooperation such as in worldwide communities of practice (2014, p. 3).

Moreover, many students in Europe have to find a part-time job (Fottrell, 2013; Richmond, 2013), which leads to a higher education system that is undergoing a process of adaptation to the actual needs of current students. European students are very concerned with the uncertain economic situation that affects many countries, and working to improve their future employability is a vital strategy in order to have more opportunities to be accommodated by a turbulent job market. Pervasive learning environments (PLEs) are an educational system aimed at students who cannot attend daily lessons within

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an inflexible schedule at a particular place. PLEs may provide a successful response to these students by offering them time flexibility and a digital context adapted to their priorities. As De Pablos *et al.* (2011) point out, the challenge lies in constructing educational models able to give a response to particular educational concepts. Therefore, it is necessary to talk about constructivist, interactive and cooperative learning models which essentially target a flexible education that supports knowledge building. The authors of this article have used the cooperative learning approach, which differs from collaborative learning. Cooperative learning or group work implies that all, most or some learners contribute to achieve a final goal, while collaborative learning “features its interdependence among participants and different contributions” in order to complete a task (Wang, 2014, p. 16). Without the completion of each individual exercise, the collaborative task would not be achieved (García-Sánchez, 2014). As Wang explains, cooperative learning does not require so much planning, as collaborative learning does, and students’ roles may not be specifically defined when cooperating with others (Wang, 2014, p. 17).

In fact, one of the basic principles of the European Higher Education Area (EHEA) is the promotion of a lifelong learning process among professionals working in any field. Each European citizen is encouraged to enhance and to be up-to-date with the innovations that emerge in his/her area of specialism. In 1998, Lévy asserted that for the first time in the history of humanity, most of the acquired skills by a person at the beginning of their professional life will be outdated at the end of their careers. As a result, professionals are required to continually update their knowledge, understanding and skills via a process of continued professional development (CPD).

The traditional belief that the learning process must be established in an educational center (school or university) is no longer the only possibility. As Kurti *et al.* (2007, p. 19-20) report: “This latest view on technology-enhanced learning supported by wireless technologies and pervasive computing is referred to as pervasive learning”. The use of technologies provides the opportunity to design innovative educational activities so that students can develop a more flexible schedule. New mobile learning platforms such as *Myst* (Laine *et al.*, 2010) or *SEU-ESP*, which support a pervasive kind of learning (Luo *et al.*, 2010), have consequently emerged. However, in this paper, the focus will be the employment of the Virtual Learning Environment (VLE) *Moodle* at the Universidad de Las Palmas de Gran Canaria (ULPGC). This VLE has been able to adapt to different learning processes: initially from e-learning to blended learning (b-learning) in order to finally develop a pervasive learning approach. This platform, with its many tools, has attempted to provide an effective response to students’ needs. In some cases, this response may be through e-learning, in other cases, through b-learning or

even through pervasive learning. In other words, learning may take place by combining or blending distance education and traditional lessons. Yábar *et al.* (2007) assert that the teaching/learning process within the EHEA is changing from a teacher-centered model (teacher conveys knowledge) to a learner-centered model (learner builds knowledge) that may be supported by autonomy, cooperation and collaboration (García-Sánchez, 2014, 2015; Simoes and Pinheiro, 2014).

In addition to considering the needs of students, another important aspect in any teaching/learning process should be highlighted: motivation. A number of scholarly studies (Arnone *et al.*, 2011; Waheed *et al.*, 2015) have demonstrated that motivated and curious students obtain better results and more involvement in a subject than students who are not motivated or have no curiosity. Ai-Lim Lee *et al.* (2010) established a meaningful relationship between motivation and perceived learning effectiveness in a course taught by means of the *Moodle* platform. Therefore, the use of VLEs seems to be a highly engaging tool to encourage not only individual learning, but also cooperative learning. Furthermore, as Waheed *et al.* (2015) report, the employment of the VLE is frequently combined with the use of other portable devices, such as smartphones, tablets, iPads, iPods, notebooks, and small-sized equipment that can be easily carried anywhere and anytime, opening many windows to knowledge. The combination of these portable devices along with the adequate virtual platform may turn the teaching/learning process into an attractive prospect for any student (Passey *et al.*, 2004).

Background

A vast volume of literature has dealt with the effectiveness of VLEs as an essential space to develop the teaching/learning process of any subject successfully. More than a decade ago, some studies (Kanuka and Kreber, 1999) demonstrated the important role of virtual environments in building knowledge. Some more recent studies (Arnone *et al.*, 2011; Laine *et al.*, 2010) have focused on the learning methods that have emerged as a result of pervasive computing (Shen *et al.*, 2009; Vinu *et al.*, 2011). This is a rapidly developing area of ICT, and it implies an integration of ICT into people’s lives and environments. This kind of learning takes place by using different tools, such as mobile devices (tablets, laptops, mobile phones, among others). Obviously, pervasive computing devices enable learning situations that occur in both the physical and the virtual world (Muñoz-Cristóbal *et al.*, 2014, p. 31). The principles of pervasive computing are, as Hansman *et al.* (2003) emphasize: decentralization, diversification, connectivity and simplicity. Shen *et al.* (2009, p. 176) state that “pervasive learning is supported by wireless communication”.

The *Moodle* platform is another useful resource to implement this kind of learning. Used effectively, this VLE may be a smart space that enables students to learn and reinforce subject content. It allows learners to have instant access to learning; to build and reinforce knowledge by means of teamwork activities; to take tests, and quizzes, to post recorded videos and multimedia materials, among other tasks.

In the particular area of English for Specific Purposes (ESP) instruction, different studies have shown how motivating the use of the *Moodle* virtual platform is. Luján-García and García-Sánchez (2014) reported on the effectiveness of some resources of this platform in the ESP classroom-by means of the online-glossary as a useful activity to present and learn new specific vocabulary. In addition, discussion forums help with the improvement of students' writing skills in English or any other foreign language. Gros-Salvat (2004) also found that the use of discussion forums in VLE is a highly motivating tool to encourage active discussions among students. Peterson (2008) suggested that *Active Worlds* is an environment with great potential, as it brings together learners in an engaging new communication context that appears to foster the types of interaction that play a central role in second language learning.

Having an attitude of acceptance and encouragement towards the use of VLEs such as *Moodle* as a platform to reinforce the teaching/learning process of any subject may be a crucial step in taking advantage of its benefits (Harnett *et al.*, 2011; Waheed *et al.*, 2015). In this study, existing perceptions and attitudes of undergraduate students and teachers at the Universidad de Las Palmas de Gran Canaria (ULPGC) in Spain towards *Moodle* in higher education will be examined.

Research questions

This piece of research intends to shed some light on the present use of the *Moodle* platform by students and teachers at the ULPGC, Spain. In order to understand the progressive implementation of this Learning Management System (LMS) and the way pervasive information and communication technologies support new ways of learning about different subject matters, some research questions have been formulated. In addition, the educational usefulness of these VLEs for both learners and students will be analyzed.

The specific research questions for this study are:

- What are the current perceptions of teachers and undergraduate students at ULPGC regarding the *Moodle* platform to support pervasive teaching/learning?
- Is the use of *Moodle* a source of motivation for teachers and students at ULPGC?
- What are the *Moodle* resources that contribute to knowledge construction and interaction at ULPGC?

Method

The procedure of collecting data consisted of administering two online surveys; one of them was addressed to a sample of undergraduate students, and another questionnaire addressed teachers at the ULPGC during the period between October 2014 and January 2015. The students' survey was in Spanish and English, therefore, international and Erasmus students could also participate in this study. In the case of the survey addressed to teachers, the language used was Spanish, since most of the surveyed instructors were Spanish. Both surveys were composed of different sections. Despite being anonymous, there was an initial section where the participants were asked to provide some personal information, such as their gender, age and degree.

Sample

The sample encompassed a total of 100 undergraduate university students from different fields. Some of them had a technical background, since they were "Industrial Design and Product Development Engineering" degree students. The rest of the students' sample was taken from a social science background; the degree in "Social Work". With reference to the sample of teachers, a total of 31 instructors participated in this research. Similarly to students, teacher participants belonged to various fields: Industrial Engineers, Telecommunications Engineers, Linguists and Lawyers, among others.

Findings

Firstly, the findings obtained from the *students'* survey will be presented. Secondly, the ULPGC *teachers'* opinions with regards to their use of *Moodle* will be shown.

Students at ULPGC and Moodle

The first question was: Do you regard the Virtual Platform a useful space to teach/learn any subject? The answers are quite revealing, since 96% of the participants confirm that this space is really helpful to teach/learn any subject. The remaining 4% can be broken down into those students who do not know, or those students who do not find this environment useful for teaching and learning. These figures show that the vast majority of the younger generation is used to using digital spaces to access and exchange information (Figure 1 shows the results of this question).

Question number 2 deepened the understanding gained in question number 1, showing specifically whether students thought that any subject (technical, languages, theoretical, practical) could be taught by using *Moodle*. As shown in Figure 2, the participants' responses show the opinion that not all subjects may be taught by means of

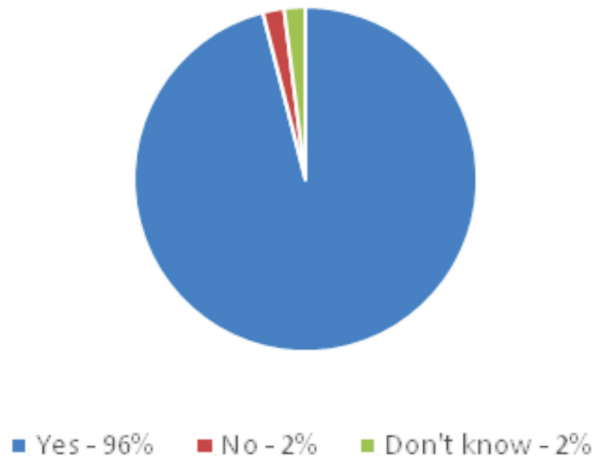


Figure 1. Do students regard the Virtual Platform a useful tool to teach/learn any subject?

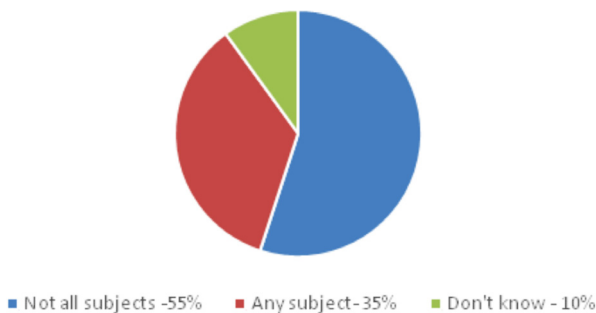


Figure 2. Do students think that any subject (technical, languages, theoretical, practical) can be taught by using the virtual platform?

this LMS has the highest score, 55%. The second highest score, 35%, is for those students who think that any subject may be taught by using this VLE, and 10% of participants reported that they simply do not know.

Question number 3 inquired about the activity that students found more interesting on the Virtual Platform. Respondents were provided with six different options: *interactive tests*, *discussion forums*, *online glossaries*, *wikis*, and *others*, and they could choose up to two answers. The findings suggest that discussion forums seem to be the most popular among students, with a score of 57%. The use of discussion forums contributes to enhancing formal discussions and learning exchanges everywhere and at any time, which addresses innovative ubiquitous learning strategies (Cope and Kalantzis, 2009; García-Sánchez and Luján-García, 2015). As Gros-Salvat (2004) has pointed out, the forum is one of the most popular activities posted on VLEs in order for learners to participate in pervasive learning. The second most chosen activity is the interactive test, since 52% of respondents chose this exercise.

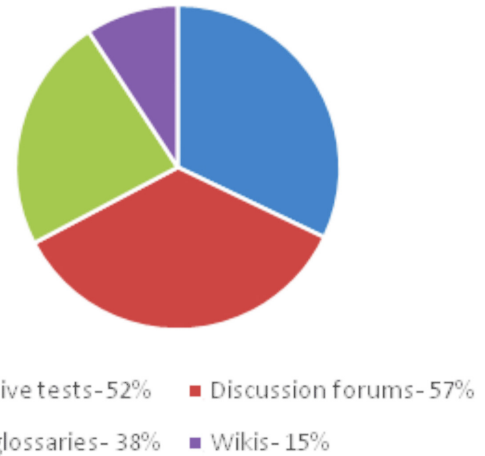


Figure 3. Which Virtual Platform activities do students find more interesting?

The following activity is the online glossary, chosen by 38% of students. The next score is 25% of participants who chose the option “other activities” as the most interesting ones. The least popular was the wiki, chosen by only 15% of students. Figure 3 displays the students’ responses.

The following question, number 4, asked for the effectiveness of the discussion forums as a useful tool to improve learners’ writing skills in English. The findings state that most participants, 79%, regard this specific activity as helpful for improving writing skills in the target language. A percentage of 11% of students do not share the same opinion, since they do not regard this activity useful, and the remaining 10% of respondents do not know, as shown in Figure 4.

Discussion forums are frequently used in our English classes, as they are attractive and quite motivating for the majority of students (79%). Up-to-date topics are usually presented by means of controversial questions that draw out the learners’ opinions and experience, which

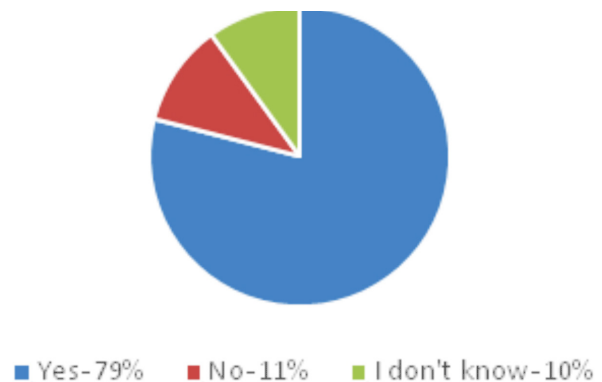


Figure 4. Are the discussion forums an effective tool to improve your writing skill in English?

are generally quite interesting and thoughtful. Moreover, the fact that the discussion forum is posted on the Virtual Platform for all classmates encourages students to pay special attention to other linguistic aspects, such as punctuation, paragraph structure, correct grammar or appropriate vocabulary. The responses regarding English written skills have been of special interest in this study, since as ESP linguists, we were interested in students' various answers. Besides, the delivery of English language skills is presented in different degrees at ULPGC with the intention of improving language and communication skills at level B1, the minimum necessary accreditation to complete any undergraduate degree in Spain.

The following Figure 5 is an example of one discussion forum implemented in the second term of academic year 2014-15 in the subject of *English* in the degree in Telecommunications. Students were asked to contribute their opinions and experiences regarding the use of cell phones. They had to use a grammatical structure and some vocabulary related to the telephone that had previously been studied in class. Generally speaking, students like to discuss current topics like this on a forum and see their ideas posted, which suggests that they put some effort into organizing their ideas into correct paragraphs. Consequently, most students (79%) consider this tool a useful one to improve their writing skills in English.

Discussion Forum 2. You and your telephone

TEACHER: Discussion Forum 2. You and your telephone de Carmen Luján García - viernes, 20 de febrero de 2015, 11:34

Dear students,

Answer the following questions in a few lines (Remember to write complete sentences with a SUBJECT + a VERB + COMPLEMENTS). Include at least a relative clause.

Is the telephone the most frequent means of communication that you normally use? Could you possibly live without a cell phone nowadays?

- *Which type of activities (leisure, academic, professional) do you normally do by means of your cell phone?*
- *Do you usually download apps on your phone?*

STUDENT 1: Re: Discussion Forum 2. You and your telephone de David Jiménez Fernández - sábado, 21 de febrero de 2015, 10:11

Yes, it is. I think I could live without my phone. I can use my PC to communicate with people by emails. Frequently I let it at home (or just turn it off) because I want to disconnect, and I believe it is not healthy to take your phone with you every day, all day.

I use my phone for academic and leisure activities. If my friends are going to the court they call me, and if I want to verify an exercise, I use my phone to talk to someone who I know that have done it well.

No, I don't. I just have the apps which came with my phone and WhatsApp app, Instagram app and WordReference app.

Figure 5. Example of discussion forum.

Question number 5 compiled data on the effectiveness of the ESP online glossary to acquire new vocabulary related to the specific fields of students' study (Engineering and Social Work). As Figure 6 shows, the findings demonstrate that most participants, 79%, regard this activity as an effective means to learn new vocabulary. Only 10% of respondents disagree with this opinion, and the rest 11% of students do not know.

This activity, in particular, has been largely used by us as a means to motivate students and encourage them to learn new specific vocabulary. Sometimes, it is not easy to present new vocabulary to students in a motivating way that is not simply a list of terms that they need to use in their fields. Our experience in the ESP classroom has proved to be quite positive when this digital resource has

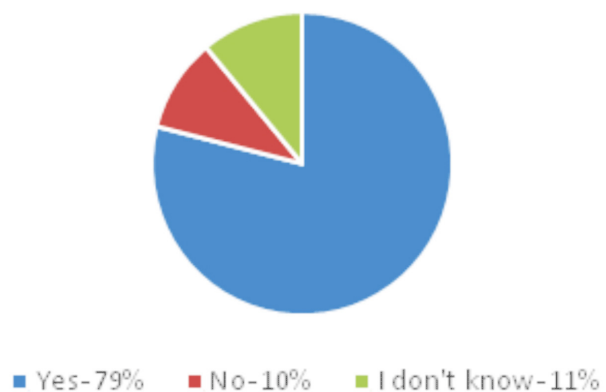


Figure 6. Is the online glossary an effective tool to acquire new specific vocabulary?

been used. Figure 7 provides some definitions by some students of specific terms within the online glossary of the subject of *English* in the degree in Telecommunications (academic year 2014-15). Students freely chose 5 terms within the field of Telecommunications and they defined those terms by including the phonetic transcription of the defined word in addition to a sentence where the term was used in context. This “vocabulary in context” exercise has often been promoted in our EFL/ESP sessions because not only does it help learners to remember key concepts, adapted to their personal and professional experiences, but it also improves sentence formation, grammar and lexis. Students find it highly motivating to build their own definitions and post them on a virtual glossary that they all share. It is a group work exercise since classmates contribute to developing this activity successfully.

The next question, number 6, focused on whether student participants cooperated with other students in their learning process by reading the others’ contributions on the discussion forums, and by viewing the online glossary to study the terms proposed and to avoid repeating the same definitions. The responses show that 77.5% of respondents state that they do not just make their contributions, but they

also read their classmates’ comments or definitions, which stresses the importance of group interaction. However, 12.24% of participants do not read what their mates have written, and 10% of participants responded that they do not know. These findings point out that when students participate in these activities (discussion forums and online glossaries) not only are they improving their writing skills and acquiring new vocabulary, but also participating in a cooperative learning environment, which is shaped by individuals to address a common group goal. It is demonstrated that both cooperative and collaborative learning can be quite effective and meaningful for students (Arnold *et al.*, 2012; Dixon, 2012; García-Sánchez, 2014, 2015). Figure 8 shows these results.

Question number 7 inquired about the location from which students usually accessed the Virtual Platform. Student participants were provided with three choices: *from home, from university and from other places (specify)*. Many students chose more than one response for this question. Ninety-five per cent of respondents normally accessed the ULPGC Moodle platform from home, 34% of participants chose also from university, and only 4% of respondents chose from other places (bus stop, beach,

English and Telecommunications GLOSSARY

TEACHER: Instructions for the course glossary.

Each student should post a word per unit. It is 5 words in total. Please, make sure that your word has not yet been included. Together with the term, you should add the pronunciation between /.../, the explanation/definition of the word (DON'T COPY DEFINITIONS FROM DICTIONARIES), and finally, an example of the term in context. See the example below:

RADIO /'reDIOstud/. It is an electronic device which is used for listening to music, interviews, programmes, etc.
Example “I like to listen to BBC radio station when I drive to work”.

A STUDENT 1: Saúl Santana Santana - jueves, 26 de febrero de 2015, 16:54

Amplifier
/'æmplifier/
It is a device which is used to increase or amplify the amplitude or the intensity of a signal.
Example: “He bought a sound amplifier for his car. Now the music into the car sounds much louder than before”.

Figure 7. Example of online glossary.

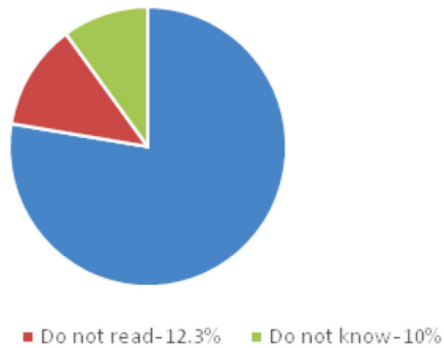


Figure 8. Do students read their classmates' contributions to the virtual forums and glossaries?

street, park, among others). Therefore, it seems that most students still predominantly connect to *Moodle* when they are at home. Obviously, participants generally access the VLE to work on it, and it is necessary to have a space that enables work. Being in other places like at the beach or in the street, many students possibly do not find appropriate conditions to work in calm, nor does the platform seem to offer frequent mobile learning activities to do whilst on the move, for instance.

Question number 8 (as presented in Table 1) was: which kind of device do you usually use to access *Moodle*? Different possibilities were offered to students: *tablet or iPad*, *cell phone or smartphone*, *personal computer*, and *others*. Many students chose more than one option and the results assert that the most frequently-used device for students, with a score of 94% of participants, is still the personal computer. Woessmann and Fuchs (2004) found similar results in a piece of research. The second position is for the smartphone, with a score of 35% of respondents who chose this option, and the least frequently used is the tablet or iPad, with a score of 26%. None of the respondents chose the option of other devices. To a certain extent, this result could be expected, since not all students own a tablet or iPad, but the majority of them have a personal computer to work with, and a cell phone to be socially connected. As regards the use of cell or smartphones, the reality is that most students own one, but the size of the screen is not big enough to work with this device in a comfortable manner (Table 1 summarizes these findings).

Question number 9 inquired about whether students had felt confident using the *Moodle* platform. The findings show that most of the student participants (90%) confirm that they feel quite confident. A score of 6% of respondents state that they do not feel confident enough, and finally a score of 4% of respondents assert that they do not know. It may be inferred that the use of the VLE is a widely-consolidated space among most students at the ULPGC (Figure 9).

Table 1. Which kind of device do students usually use to access the Platform?

Tablet or iPad	26%
Cell phone	35%
PC	94%
Others	0%

The last question, number 10, asked whether *Moodle* is an outdated spacetoe be used in the ESP teaching/learning process. The responses, as shown in Figure 10, point out that most students, 78%, do not regard this VLEas old-fashioned. Sixteen per cent of students replied that they do not know, and the rest, 6% of participants, stated that it is obsolete (Figure 10).

Thus, the use of *Moodle*, far from being discarded as an outdated tool, may be improved and exploited in order to enable a pervasive learning environment that provides multiple, aforementioned, advantages (flexibility of time and place, among others). In summary, surveyed students at the ULPGC seem to have a positive perception of *Moodle* as a useful VLE to develop a pervasive learning approach.

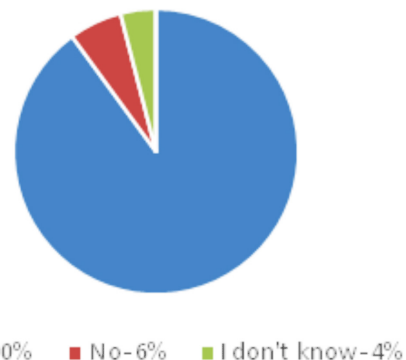


Figure 9. Do students feel self-confident when they use the *Moodle* Platform??

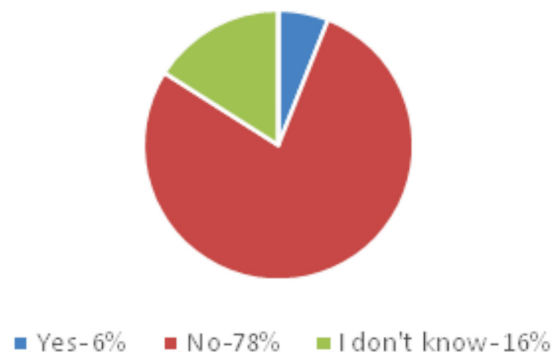


Figure 10. Do students consider the *Moodle* Platform an obsolete resource?



Figure 11. Do teachers consider the *Moodle* Platform a useful LMS to teach?

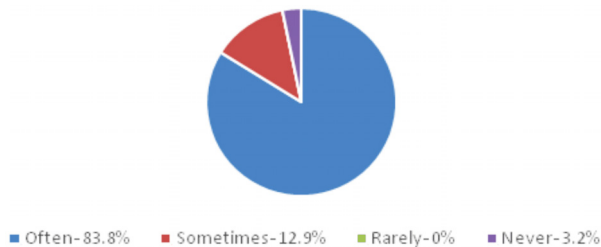


Figure 12. How often do teachers use *Moodle* as a support to classroom instruction?

Teachers at ULPGC and Moodle

This section will deal with the *teachers'* responses to the survey, which was also composed of ten questions. Some of them were quite similar to the ones of students' survey, but others were different.

Question number 1 inquired whether the surveyed teachers regarded *Moodle* as a useful digital environment for teaching. As shown in Figure 11, the findings reveal that 100% of the teacher participants consider this platform useful for teaching. Consequently, there seems not to be any question among participants about the usefulness of this LMS, which supports our initial hypothesis that we have progressed from using e-learning platforms to planning pervasive learning environments for our courses.

The second question was: do you use the *Moodle* platform as a support to classroom instruction? Different options were provided to respondents: *often*, *sometimes*, *rarely* and *never*. The findings show that 83.8% of surveyed teachers often employ this tool. The second option, sometimes, was chosen by 12.9% of participants, and 3.23% of teachers replied that they never use this resource. The option rarely was chosen by nobody. This result reveals that most teacher participants use the Virtual Platform at the ULPGC, as Figure 12 displays.

Question number 3 asked for the *Moodle* platform activities that teacher participants use most frequently. Teachers had to choose two of the most-employed tools by

them. Different options were provided: *interactive tests*, *discussion forums*, *online glossary*, *wiki*, *others*. The findings show that the highest score, 67.7%, is for the option other activities. The second position is for the discussion forums with a score of 51.6%. Interactive tests are used by 16.1% of teacher participants, 9.6% of respondents use online glossaries, and 6.4% of participants use wikis (see Figure 13).

Regarding the use of discussion forums, almost two decades ago, Anderson and Kanuka (1997) did some research on the use of this tool in a professional learning environment, and they foresaw the adoption of online forums as an effective and functional means of consultation and of teamwork among professionals.

Since their creation, in 1994, wikis as a tool for quick exchange of ideas among programmers have become a very useful resource whose popularity may be evidenced in the well-known *Wikipedia*, created in 2001. It is a tool that enables cooperative work so that information may be compiled and contrasted collectively. As Tancer (2007) reports, *Wikipedia* is currently the most popular and extensive work of reference on the Internet. Research has provided evidence of the positive aspects of the use of this resource to encourage students' interaction, amongst other things. According to Gimeno and García (2009) "Wikis are one of the increasingly-used social network devices to support cooperative learning tasks in the language curriculum".

Online glossaries are especially useful to teach/learn specific vocabulary related to a particular field (e.g. medicine, telecommunications, computers, and so on). It may become a tedious task to present new vocabulary by providing learners with lists of words they need to learn. An online glossary built through students' cooperative work may turn this task into an attractive and motivating one. Chamizo-Sánchez and Fernández-Torres (2013) provide recent evidence of the successful use of online glossaries for undergraduate and postgraduate university students in Spain.

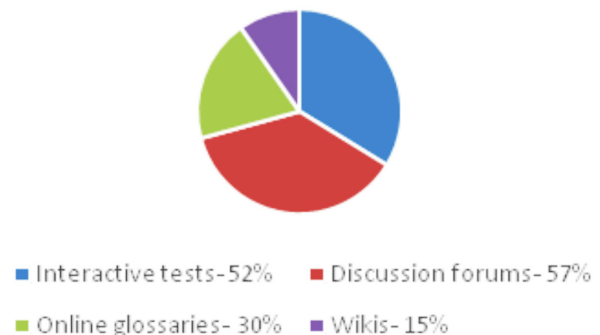


Figure 13. Which *Moodle* activities do teachers use more frequently?

The following question, number 4, asked teacher participants whether they thought that students really learnt with the use of ICT in and out of the classroom. According to Figure 14, the highest score, 87.1% is for those teacher participants that assert that students really learn with the use of ICT. A score of 12.9% of respondents do not know and no teacher replied that students do not learn with ICT.

Question number 5 asked teacher participants whether they feel comfortable using the *Moodle* platform and its activities. Most of the respondents, 90.3%, replied affirmatively, whereas only 9.6% teachers did not feel comfortable when they used this LMS, as Figure 15 shows.

This question is closely related to the varying competency levels in the use of technology and the Internet. Consequently, teachers who are very familiar with ICT tools usually feel comfortable when they use them, since their competency level is average or high. Otherwise, poor competency level in the use of ICT may lead teachers to feel uncomfortable and a certain reluctance to use these resources (Luján-García, 2009).

Question number 6 was: where do you usually access the Virtual Platform from? Different options were given: *from home, from university, from my car or means of transport, from other places*. In this case, the answers were different from the students'. The highest score, 87.1%, is of the teacher participants who replied that they usually



Figure 14. Do teachers consider students really learn using ICT?

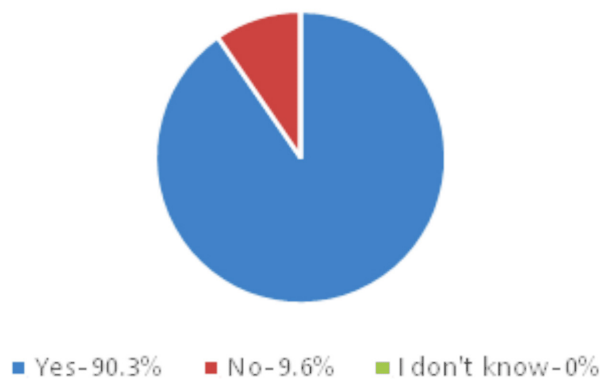


Figure 15. Do teachers feel comfortable using *Moodle*?

access the platform from university. Another remarkable percentage, 77.4%, of respondents do it also from home. A score of 12.9% of teachers access the platform from other places, but no participants responded that they access the VLE from a car or a means of transport (see Table 2).

Question number 7 inquired about the kind of device used by teacher participants to access *Moodle*. Four different options were provided: *tablet or iPad, cell or smart phone, PC or others*. Many respondents chose more than one option. However, 100% of participants replied that they use their personal computer to access the *Moodle* platform. A score of 16.1% of teachers chose tablet or iPad, and only 3.2% chose cell or smartphone. These results are similar to the ones of the students who also regularly use their PCs to access the Virtual Platform. Compared with the students' responses, it is also striking that learners (35%) use their cell and smartphones more often than teachers (3.2%) do to access *Moodle*. It is beyond any question that students are generally more familiar with ICT devices than teachers, since they have grown up surrounded by these means, whereas most teachers have started using these resources as adults (see Table 3).

Question number 8 assesses teachers' mastery of the kind(s) of ICT resources that they use in the classroom. A scale was provided for participants to rate their competency: *excellent, good, acceptable* and *poor*. The highest score is 48.3% of teachers who regard their level of mastery of ICT as good. The second score is 25.8% of respondents who choose acceptable. The next chosen response is excellent, with a score of 22.5%, and the last one is poor, selected by one teacher only (3.2%). In general terms, it could be asserted that teacher participants evaluate themselves quite positively when it comes to the use of ICT in the classroom (see Table 4).

Table 2. Where do teachers usually access the virtual platform from?

From home	77.4%
From university	87.1%
From my car or means of transport	0%
Other places	12.9%

Table 3. Which kind of device do teacher participants use to access *Moodle*?

Tablet or iPad	16.1%
Cell or smart phone	3.2%
PC	100%
Others	0%

Table 4. How do teachers assess their mastery of ICT used in the classroom?

Excellent	22.5%
Good	48.3%
Acceptable	25.8%
Poor	3.2%

This inquiry deals with one important issue, which is the training and instructions that teachers receive in order to develop mastery in the use of ICT. The question of where or how teachers learned to use the *Moodle* Platform was not included, but in most cases, teachers have attended formative courses or are simply self-instructed. It is important to highlight that teacher training to achieve ICT competencies is essential for them to have an attitude of acceptance and feel eager and comfortable using these resources with students.

Question number 9 asked teacher participants whether they would employ any other platform to teach/learn any subject, and which one. The highest score (54.8%) is for teachers who stated that they would not use another VLE. A percentage of 35.4% of teacher participants asserted that they would use other platforms, websites and resources, such as *BBC learning English*, *Present.me*, *Ubilinqua*, *Google drive*, *YouTube*, *Vimeo*, *Dropbox*, *Skype* (for private tutorials), social networks, tutorial videos, round tables and workshops. The rest of the teachers (9.8%) reported that they would need instruction to learn how to use a new platform. Another teacher stated that any platform is adequate if you use good materials and images.

The last question was: which degree/s or master/s subjects do you teach? The answers of the participants were various. Thirty-eight point seven per cent of participants belong to the faculty of Arts and Humanities. A total of 32.2% of teachers work in the Social Sciences department, and the rest (22.5%) of the participants belong to the technical area of Computing Science. Two participants (6.6) did not respond to this question.

Conclusions

The research questions of this paper have been answered after conducting this research at the ULPGC. Teachers and undergraduate students seem to have positive perceptions, feel comfortable and motivated when using the progressively improved space of the *Moodle* platform at this university. The resources that the *Moodle* platform provides are attractive and motivating for teachers and students at ULPGC.

In the case of students, discussion forums and interactive tests are well-regarded within the virtual space

of *Moodle*, followed by online glossaries, and other tools. With regards to teachers, discussion forums and other resources are the top chosen tools, significantly followed by interactive tests, online glossaries and wikis. Many of these resources, especially discussion forums, online glossaries and wikis, contribute to building knowledge and interaction in a cooperative way.

The implementation of pervasive learning may be observed in the application of an environment which may be used inside and outside the classroom, which therefore would also imply flexibility in terms of place and time. In fact, both teachers and students have stated that they access *Moodle* from home, from university and from other places. In addition, they use a variety of devices to get connected: tablets, iPads, cell and smartphones, laptops or PCs.

The Internet has opened the doors to knowledge and the construction of a collective intelligence outside the traditional academic structures. The *Moodle* platform is one more LMS that offers this combination between learning happening inside and outside the classroom. This VLE provides a space for the transformation of teachers' ideas into pervasive learning environments that support their teaching skills (Muñoz-Cristóbal *et al.*, 2014, p. 32).

Therefore, the use of VLEs such as *Moodle* should be encouraged in any higher education institution, since the main agents in current higher education are students rather than teachers (Attard *et al.*, 2010). Students need to actively participate in their own process of knowledge construction, and *Moodle* enhances this active participation, providing a wealth of new ways to build, access and share information.

This philosophy does not imply that face-to-face instruction has to disappear. Our position supports the combination and co-existence of both educational approaches, a blended education (b-education) in which learning takes place in the classroom and is reinforced by the use of ICT resources such as the *Moodle* platform. As a matter of fact, in this study, all surveyed teachers regard *Moodle* a useful space to teach and learn, and most of them (83.8%) use this space as a support for classroom instruction (b-learning).

In the specific case of the discussion forums, the benefits outweigh the drawbacks, since these discussions facilitate interaction, constant exchange of ideas and the development of a learning community. As Mallo *et al.* (2011) report, the discussion forums enable the teacher to combine theory and practice and it provides a space for reflection and analysis, which may involve the active commitment of students in their learning process, constructing significant knowledge. The findings in this study confirm the positive perception of the forum by both teachers and students. Other tools, such as interactive tests and online glossaries, are also attractive for students, in addition to the fact that they are also frequently used by teachers and students at ULPGC.

In European universities, it is difficult to imagine a current teaching/learning situation in which Moodle or any other VLE would not be involved. This study confirms the positive perceptions of teachers and students towards the use of this e-space, which despite the fact that it is not new, it may be improved and exploited to the extent where it becomes quite enriching in present-day higher education. Moodle at ULPGC enables a pervasive learning environment that fosters time and space adaptability and best learning practices for current educational communities.

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