Acceptance of Moodle by professors: a study in a Portuguese Higher Education Institution

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Abstract

This paper presents and discusses the results of a study carried out with professors of the University of Aveiro, Portugal (UA), which aim is to characterize their acceptance of Moodle. The data were collected through the application of a questionnaire based on the Technology Acceptance Model. In general, the professors expressed a positive attitude towards the items that measure the Perceived Ease of Use, the Perceived Usefulness, the Attitude Toward Using and the Social Influence. There were defined groups of professors based on gender, scientific area and age group, and statistical tests were performed. Although the majority of the items did not show any statistical significant differences between the groups, probably revealing that the use of Moodle is already widespread in the teaching and learning process at UA, it was possible to identify some differences, mainly with respect to gender and scientific area.

Keywords: Moodle; Higher Education; Acceptance; TAM; Hypothesis testing

1. INTRODUCTION

The use of technologies has grown in education, allowing to have easier access to information. Among the Technologies and Information Systems, the technologic platforms play an important role in supporting the Teaching-Learning (TL) process.

The diversity of interactive and multimedia equipment and the availability of broadband communication networks make available to participants in the TL process an inexhaustible set of information, as well as teaching methods. Students own and use a diversity of technologies, but institutions and instructors have yet to seize opportunities to create more varied learning experiences (Dahlstrom, Boor, Grunwald, & Vockley, 2011).

In this context, Learning Management Systems (LMS) such as Moodle, are important support tools for the TL process. In most cases LMS are used as a simple repository of documents provided by professors and accessed by students. However, with the possibility of integration with other systems, those platforms should not be seen only as a repository of support documents, but as a means of helping inducing new models of student-centred learning.

By the use of new technologies, TL methodologies at universities have been changing progressively. Reduction of costs, increase of effectiveness and teaching efficiency are allowed by new virtual tools and resources that Internet provides. Moodle is the most widely used LMS, promoting virtual teaching environments. The emerging of high speed connections to the Internet and the Web 2.0 contributed to a new

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range of possibilities, such as the reduction of teaching and learning costs and the increase of students' satisfaction and motivation (Fernandez et al., 2011).

This article analyses the acceptance of Moodle in Higher Education (HE), and presents and discusses the results of a study carried out at the University of Aveiro, Portugal (UA) through the application of a questionnaire to its professors, with the objective of characterizing the acceptance of this platform. First, a descriptive analysis was performed, in order to characterize the participants and the variables that measure their acceptance of Moodle. Afterwards, Independent Samples t-tests and Analysis of Variance (ANOVA) were performed in order to verify whether there were statistically significant differences between the average levels of agreement with each item between groups of academics based on gender, scientific area and age.

2. ACCEPTANCE OF MOODLE IN HIGHER EDUCATION

The Moodle is the LMS most used in HE (Machado & Tao, 2007) and represents the most widely used open-source LMS that enables the creation of a course website, ensuring their access only to enrolled students (Cole & Foster, 2008). This platform allows the exchange of information among users geographically dispersed, through mechanisms of synchronous (chats) and asynchronous communication (discussion forums) (Mehrabi & Abtahi, 2012). In a functional perspective, it has easily configurable features, allowing the creation of student assessment processes (quizzes, online tests and surveys), as well as managing their tasks with their timetable (Itmazi, Megías, Paderewski, & Guiérrez, 2005); besides offering a wide variety of complementary tools to support the TL process.

The Moodle has three levels of use, with different features: (i) administrator (the manager of the platform), (ii) teacher (trainer, facilitator, promoter) and (iii) student (learner, participant) (Mehrabi & Abtahi, 2012).

The Moodle "can provide a means of monitoring quality of assessment and feedback provided by instructors/teachers, and also; a fantastic opportunity for sharing good practices across the college" (Jackson, 2015, p.11). Moodle is a cost-effective learning environment that proved to be beneficial in terms of stimulating students' interest for homework tasks and their commitment in solving these tasks.

The acceptance of technologies is usually evaluated through theoretical models being the Technology Acceptance Model (TAM) the most widely used one (Venkatesh, Morris, Davis, & Davis, 2003). According to TAM, the Actual System Use (ASU) of the technology in evaluation is determined by Attitude Toward Using (ATU), being this variable influenced by other two variables: Perceived Ease Of Use (PEOU) and Perceived Usefulness (PU). Those two variables are, in turn, influenced by External Variables (EV) (Davis, 1986).

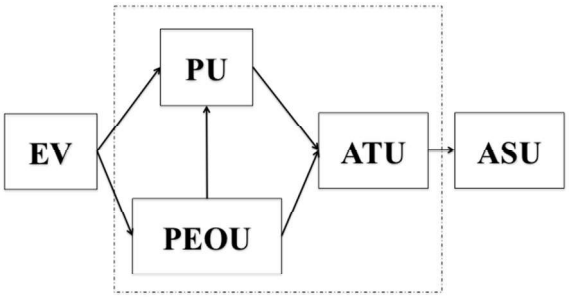

Figure 1–TAM (Davis, 1986)

PEOU is defined as the degree to which an individual believes that the use of a particular system is intuitive and does not require great effort (Davis 1986; Davis, 1989). PU is defined as the degree to which an individual believes that use of the system contributes to increase the performance of their work (Davis, 1986; Davis 1989; Davis, Bagozzi, & Warshaw, 1989). Besides being influenced by external variables, it is also influenced by PEOU, since technologies perceived as easier to use tend to be perceived as more useful. ATU is defined as a positive or negative feeling of an individual towards the use of the system (Davis, 1986; Davis, 1989; Davis et al., 1989) and is influenced by PU and PEOU.

In practical terms, the application of TAM is an extension of the original model where EV are added according to the specific characteristics of the analysed technology (Oum & Han, 2011).

3. MATERIAL AND METHODS

This study, carried out at the University of Aveiro (UA) aims to analyse the acceptance of Moodle in HE by professors, being its main objectives: (i) to characterize the use and the acceptance of Moodle at UA; and (ii) to compare the acceptance of Moodle between some groups of professors established based on gender, scientific area and age.

The UA structure is based on 16 departments and 4 polytechnics schools, comprising the following areas: Life Sciences and Health, Natural and Environmental Sciences, Exact Sciences and Engineering, and Social Sciences and Humanities, with 184 courses (undergraduate and graduate courses), 14,280 students, and 903 professors (UA, 2016). The Moodle is the LMS adopted by the UA.

The data collection of this study was done through a questionnaire designed based on literature review and applied during March and April 2016 (1st data collection phase) to all the professors of the UA (903). There were obtained 90 answers from diverse academic units.

The final questionnaire resulted from the application of a prior version to a pilot sample of 5 professors. The questionnaire is composed of 27 questions and is divided into the following two sections:

- Characterization of the participants;
- Characterization of the use and acceptance of Moodle.

The acceptance of Moodle was performed with the variables from TAM, using a five-point Likert scale in order to measure the level of agreement with the selected 21 items, presented in Table 1.

Variable	Item
PEOU	PEOU1-Learning how to use Moodle is easy.
	PEOU2-It is often necessary to consult the script support/help tutorials to use Moodle.
	PEOU3-The Moodle's menus and features are easy to understand.
	PEOU4-I get confused when I use the resources/activities of Moodle.
	PEOU5-I often make mistakes when I use Moodle.
	PEOU6-It's easy to remember how to perform the tasks related to the creation/editing of resources/activities in Moodle.
	PEOU7-Overall, I find Moodle is easy to use.
PU	PU1-Using Moodle allows me to better organize and track tasks related to the TL process.
	PU2-Moodle allows me to perform tasks without being dependent on schedules.
	PU3-Using Moodle allows me to save time.
	PU4-Using Moodle improves the outcome of the TL process.
	PU5-Overall, I find Moodle useful for the TL process.
ATU	ATU1-I like using Moodle in TL context.
	ATU2-I recommend the use of Moodle to support the TL process.
	ATU3-Overall I have a favourable attitude towards using Moodle in TL context.
SI	SI1-I use Moodle because it is the LMS provided by the UA.
	SI2-I use Moodle because I was influenced by colleagues.
	SI3-I use Moodle because I was directly or indirectly influenced by students.
	SI4-The editing features/activities in Moodle allow me to communicate/collaborate with students.
	SI5-Overall, the use of Moodle in the TL context makes me feel socially/academically more active.
	SI6-I consider that there is a tendency to develop more activities using Moodle in the future.

Table 1-Items used to evaluate the acceptance of the use of Moodle.

The collected data were analysed using the IBM SPSS Statistics 22 software. First, a descriptive analysis was performed, in order to characterize the participants (section 4.1) and the behaviour of each variable measured (section 4.2). Afterwards, Independent Samples t-tests and ANOVA were done in order to verify whether there were statistically significant differences between the average level of agreement regarding each item between the groups of academics already identified (section 4.3).

4. RESULTS AND DISCUSSION

4.1. Characterization of participants

Participants were 56 females and 34 males and the average age of respondents was 45.5 years old (s=8.52). The majority of professors were from the university subsystem (72; 80.9%) and 54.4% were Assistant Professors (49).

Considering the distribution of the respondents by the research areas it can be noticed that the majority of them were from Social Sciences and Humanities (49; 54.4%), followed by Exact Sciences and Engineering (34; 37.8%), Life and Health Sciences (4; 4.4%), and Natural and Environmental Sciences (3; 3.3%).

4.2. Characterization of the use and acceptance of Moodle

The acceptance of Moodle is evaluated by the variables PEOU, PU, ATU, and SI. Table 2 presents a descriptive analysis of the answers to the items related to the referred variables.

There was one respondent that does not use Moodle.

Item	N	Mean	Median	Mode	Std. Deviation
PEOU1	89	4.01	4.00	4	0.761
PEOU2	88	1.97	2.00	2	0.940
PEOU3	85	3.80	4.00	4	0.884
PEOU4	88	2.01	2.00	2	0.928
PEOU5	88	1.85	2.00	2	0.766
PEOU6	88	3.84	4.00	4	1.004
PEOU7	89	4.09	4.00	4	0.793
PU1	88	3.80	4.00	4	1.019
PU2	86	4.16	4.00	4	0.919
PU3	86	3.69	4.00	4	1.077
PU4	89	3.73	4.00	4	1.031
PU5	89	4.10	4.00	4	0.853
ATU1	89	4.01	4.00	4	0.832
ATU2	89	3.94	4.00	4	0.934
ATU3	89	4.08	4.00	4	0.869
SI1	89	4.64	5.00	5	0.661
SI2	81	2.04	2.00	1	1.269
SI3	82	1.74	1.00	1	1.075
SI4	89	4.00	4.00	4	0.917
SI5	83	2.67	3.00	3	1.250
SI6	88	3.80	4.00	4	0.961

Table 2–Descriptive statistics of the items

In general, academics expressed a positive attitude concerning the various items. Regarding the items PEOU2, PEOU4, and PEOU5, it should be noticed that the questions are asked using the scale with an inverted order, when compared with the other items. As a consequence, these items present low levels of agreement, average values from 1.85 to 2.01. The items PEOU1 and PEOU7 have higher level of agreement, average values from 4.01 to 4.09.

The items of PU present average values from 3.69 to 4.16. The item PU3 have an average value lower than the other items of PU. This result can be partially in line with the study from (Islam & Azad, 2015) that refer professors can consider that Moodle "add an extra load to their teaching tasks and reduce their autonomy and control in the classroom".

On average, the variable ATU present values of agreement ranging from 3.94 to 4.08.

Concerning the SI variable, the items SI2 and SI3 have, on average, lower values than the other items (2.04 and 1.74).

It should be noticed that the item SI1 presents the highest average value (4.64) of all the items, probably reflecting that professors feel the importance of having a LMS available to support the TL process, and use the one provided by the institution where they teach.

4.3. Comparison of the acceptance of Moodle between groups of professors

For comparing the acceptance of Moodle between some groups of professors based on gender, age groups and scientific area, independent samples t-tests (gender and scientific area) and ANOVA (age groups) were performed. Table 3 presents the results obtained for the items that revealed statistically significant differences (significance level of 5%) between the mean values of the groups considered.

Item	Group		N	Mean	Std. Deviation	t/F	p-value
PEOU1	Gender	F	56	4.16	0.733	2.483	0.015
		M	33	3.76	0.751		
ATU1	Gender	F	56	4.18	0.716	2.546	0.013
		M	33	3.73	0.944		
ATU2	Area	A	41	3.68	0.986	-2.475	0.015
		B	48	4.17	0.834		
ATU3	Gender	F	56	4.25	0.720	2.494	0.015
		M	33	3.79	1.023		
	Area	A	41	3.85	0.910	-2.287	0.025
		B	48	4.27	0.792		
SI2	Area	A	37	1.70	0.968	-2.227	0.029
		B	44	2.32	1.427		
SI5	Area	A	37	2.35	1.252	-2.149	0.035
		B	46	2.93	1.200		
SI6	Age group	[28, 39]	22	4.14^{b}	0.774	3.934	0.023
		[40, 49]	36	$3.89^{a,b}$	0.820		
		[50, 67]	30	3.43^{a}	1.135		

Legend: F-Female; M-Male; A-Life and Health Science, Natural and Environmental Sciences, and Exact Sciences and Engineering; B-Social Sciences and Humanities.

Table 3–Descriptive statistics and results of independent Samples t-tests or ANOVA

The comparison of the Moodle' acceptance between gender, show statistically significant differences in items PEOU1, ATU1, and ATU3, where the females present, on average, higher values than males.

According to the scientific area, the items that show statistically significant differences are: ATU2, ATU3, SI2, and SI5. In these cases, the professors belonging to the Social Sciences and Humanities area present, on average, higher values.

Regarding age groups, the only item for which there were statistically significant differences, was SI6 has between year groups, where the group aged 28 to 39 years old presents a higher mean than the group older than 49, being that the score mean correspondent to the age group 40 to 49 years old does not differ statistically from the other two groups.

It should be mentioned that 14 of the 21 evaluated items did not present statistical significant differences between the defined professors' groups.

5. CONCLUSION

This article analysed the acceptance of the Moodle by professors of the University of Aveiro, Portugal, evaluated through the application of a questionnaire based on the Technology Acceptance Model. It can be concluded that in general this platform is well accepted by the professors of the UA, and it was found that there were statistical significant differences in some of the items measured, according to groups of professors defined by gender, scientific area and age group. Nevertheless, the majority of the items did not show any statistical significant differences, probably revealing that the use of this LMS is already widespread in the teaching and learning organization's context.

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7. REFERENCES

Cole, J., & Foster, H. (2008). *Using Moodle – Teaching with the popular open source course management system* (2nd ed.). United Sates of America: O'Reilly Media.

Dahlstrom, E., Boor, T. d., Grunwald, P., & Vockley, M. (2011). ECAR National Study of Undergraduate Students and Information Technology: Educause Center for Applied Research.

Davis, F. D. (1986). *A Technology Acceptance Model for Empirically Testing New End-User Information Systems: Theory and Results.* (Doctoral dissertation), MIT Sloan School of Management.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly,* 13, 3, 319-340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: a comparison of two theoretical models. *Management science,* 35, 8, 982-1003.

Fernandez, V., Simo, P., Algaba, I., Albareda-Sambola, M., Salan, N., Amante, B., . . . Garriga, F. (2011). Low-cost educational videos for engineering students: A new concept based on video stream and youtube channels. *International Journal of Engineering Education,* 27, 3, 1–10.

Islam, A. K. M. N., & Azad, N. (2015). Satisfaction and continuance with a learning management system Comparing perceptions of educators and students. *International Journal of Information and Learning Technology*, 32, 2, 109-123.

Itmazi, J., Megías, M. G., Paderewski, P., & Gutiérrez, F. L. (2005). *A comparison and evaluation of open source learning management systems*. Paper presented at the IADIS International Conference on Applied.

Jackson, E. A. (2015). Impact of MOODLE platform on the pedagogy of students and staff: Cross-curricular comparison. *Education and Information Technologies*, , 1-17 .

Machado, M., & Tao, E. (2007). *Blackboard vs. Moodle: Comparing User Experience of Learning Management Systems*. Paper presented at the 37th ASEE/IEEE Frontiers in Education Conference.

Mehrabi, J., & Abtahi, M. (2012). Teaching with Moodle in Higher Education. *Procedia-Social and Behavioral Sciences,* 47, 0.

Oum, S., & Han, D. (2011). An empirical study of the determinants of the intention to participate in user-created contents (UCC) services. *Expert Systems with Applications,* 38, 12, 15110-15121.

UA (2016). Factos & números. from http://www.ua.pt/page/151, (14-05-2016).

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view". *MIS Quarterly,* 27, 3, 425–478.