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Utilización de plataformas virtuales: una herramienta útil de seguimiento

Virtual platforms use: a useful monitoring tool

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Resumen:
El Espacio Europeo de Educación Superior está motivando un cambio sustancial en la educación universitaria y está promoviendo el uso de las nuevas Tecnologías de la Información y la Comunicación. La plataforma virtual educativa Moodle es una de las más utilizadas en todo el mundo ya que facilita la creación de sitios de aprendizaje en línea y también proporciona datos para monitorizar la actividad de los usuarios. Este estudio se centra en el grado de utilización de Moodle por los estudiantes universitarios, siguiendo a los mismos grupos en su primer y último curso académico, encontrando una relación significativa con las calificaciones obtenidas en las asignaturas analizadas. Esta relación muestra que los estudiantes con calificaciones inferiores han utilizado menos la plataforma Moodle, lo que se ha mantenido hasta el final del Grado. Por lo tanto, se sugiere que los registros en plataformas virtuales podrían ser utilizados como un índice de interés en las asignaturas y se recomienda que se analicen durante el primer año académico para poder detectar los grupos menos motivados y así poder actuar.

Palabras claves: Universidades, Instrucción asistida por ordenador, Uso de ordenadores en la educación, Tecnología educativa, Participación estudiantil.

Abstract:
The European Higher Education Area is motivating a substantial change in university education and is promoting the use of new Technologies of Information and Communication. The educational virtual platform Moodle is one of the most widely used worldwide and also facilitates the creation of online learning sites and provides data of monitoring platform by users. This study focuses on the extent of use of Moodle by university students, following the same groups in their first and last academic year, finding a significant relation with the marks obtained in the subjects analyzed. This relationship shows that students with lower marks have used less Moodle platform, which has been maintained until the end of the Degree. Therefore, it is suggested that records in virtual platforms could be used as an index of interest in the subjects and it is recommended that they be analyzed during the first academic year in

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order to detect the least motivated groups and thus be able to act.

Keywords: Universities, Computer assisted instruction, Computer uses in education, Educational technology, Student participation.

1. Introduction

Teaching at the university level is changing and constantly updating, which is allowing its adaptation to European Higher Education Area (EHEA). This requires a change in the curriculum, adaptations of content and methodologies, as well as a large involvement of innovation-based teaching staff, with the aim of achieving quality education.

Internet and the new Information and Communication Technologies (ICT) enable the development of this teaching innovation supported by these new technologies in the classroom, promoting university education, plus virtual educational platforms. These platforms allow communication between teachers and students to improve the chances of transmission of knowledge by teachers, but also make students take active part and be involved in their own learning process, although not without problems (Ahn y Han, 2005; Pérez Moreno, 2003).

Moodle is one of the most widely used virtual educational platforms, with 80,602 registered sites in 236 countries, with more than 12 million courses, 104 million users using 111 million resources. The country with more records is the United States, followed by Spain (Moodle, 2017), with different experiences at the university level (Area Moreira *et al*., 2008; Correa Gorospe, 2005; Fernández Muñoz, 2007; González Mariño, 2006; Marín Díaz y Maldonado Berea, 2010). It is an Open Source Course Management System, also known as a Learning Management System (LMS) or a Virtual Learning Environment. Moodle is a free web application that educators can use to create effective learning sites online, that is designed to support a social constructionist framework of education.

But the Moodle platform also allows the teacher to obtain monitoring data from the platform of the subject by students through the "Reports" tool. This tool provides information on activities that different users perform on Moodle, keeps the activities and resources that have been accessed, and the date and time of access. This database generated by the activity of the students and

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teachers on the platform could be used as a complement to assessment systems teaching (Martín Galan y Rodriguez Mateos, 2012), although it is necessary processing and analyzing of data files activity (Romero y Ventura, 2007; Romero, Ventura y García, 2008; Romero *et al*., 2009). There are different researches focused on E-Learning activity or educational data through complex models that try to establish methodologies to evaluate the effectiveness in the use of these virtual platforms (Martín-Blas y Serrano-Fernández, 2009; Macfadyen y Dawson, 2010; Lee *et al*., 2016; You, 2016) and others that try to determine Predicting student failure (Márquez-Vera *et al*., 2013, 2016). The aim of this study is to establish if there is any relationship between the use of Moodle by university students and their marks in a particular subject in their first year of university, if there are differences in the use of this platform among different groups of students of the same subject and determine if these differences between groups remain years after, in the last year of their studies.

2. Method

This study was performed in the subject of the Natural Knowledge first academic year of the Bachelor Degree in Primary Education, Faculty of Education of the University of Córdoba, with 4 groups (randomly tables A, B, C and D) about 67 students each (A, N = 71; B, N = 59; C, N = 71; D, N = 69) during the first semester of the academic year 2011/12 having the same professors, and with these same students (B, N = 48; D, N = 56; only these two groups because other groups had another professors and different Moodle platforms) in the academic year 2014/15, in the subject Environmental Education.

Moodle has been used as an interactive platform for the subjects, mainly between teachers and students, i.e., as classroom support for university teaching. The content worked in Moodle is different in both subjects, but similar in respect to the resources used. The resources used have been the forums, the access to files and web addresses, labels, as well as tasks and questionnaires, designing similar platforms for the different groups. The Natural Knowledge subject is divided into three blocks with a total of 13 topics; Environmental Education subject has two blocks and a total of 7 topics, each of the topics of both subjects with a section in Moodle.

We have gathered information from all connections of students with Moodle through the "Reports" option that Moodle offers. For the first subject (Natural Knowledge), from the beginning of the course (September) until the date of examination, taking into accounts the following variables: group, time, name and actions of 270 students, this way generating a matrix of 55,024 records. For the last subject (Environmental Education) the same information was obtained of 104 students, generating a matrix of 4,204 records. The two main variables studied are the number of actions, which encompasses all interactions with the platform, and resource view, which involves accessing a resource.

We have also used the marks obtained by students in these subjects, which are the result of written examinations, attendance at practical lessons and memories assessments.

The statistical treatment was carried out with Statistica 8 software (StatSoft, Inc., Tulsa, OK, USA). We conducted descriptive analysis, analysis of variance (ANOVA), General Regression Models (GRM) and General Linear Models (GLM).

3. Results

In total, there were 55,024 records or actions in Moodle done by students during the months in which the first subject (Natural Knowledge) was taught. Of the 33 registered actions, the most done was to access the course (course view), accumulating 35% of total registrations and second actions most done were to access a document or web link (resource view), 29% of the records, the remaining actions fell below 7% (Figure 1).

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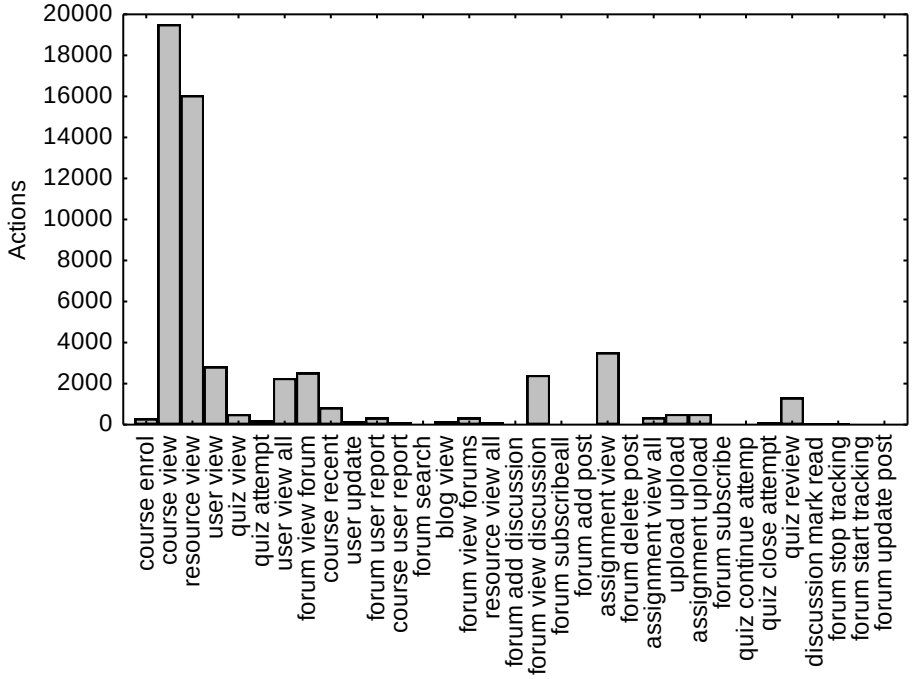

Figure 1. Number of actions performed by students of the 4 groups (first subject) in the different categories of actions of the Moodle platform

The average number of actions per student was 203.79 ± 133.69 (mean ± SD) with a minimum of 10 and a maximum of 771 actions, with significant differences between groups ($F_{3,266} = 7.97$; $p < 0.001$). By doing a post hoc test, the difference is between the D group and the other groups (Bonferroni test; MS = 16583; df = 266; $p < 0.05$), with a lower value this group (Figure 2a). Regarding the action resource view, which was the second largest action after course view, the average is 59.43 ± 35.07, with a minimum of 1 and a maximum of 227, with no differences between groups ($F_{3,266} = 2.32$; $p = 0.07$), but it is also the group D which has a lower use (Figure 2b).

Moreover, with respect to the marks obtained by students in the subject, the average is 5.61 ± 2.16, with a minimum of 0 and a maximum of 9.45 with significant differences between groups ($F_{3,266} = 6.23$; $p < 0.001$), being D the group with the lowest score (Fig. 2c), this group has significant differences from group A and B (Bonferroni test; MS = 4.41, df = 266 ; $p < 0.05$) but not with C (Bonferroni test; MS = 4.41, df = 266; $p = 0.12$).

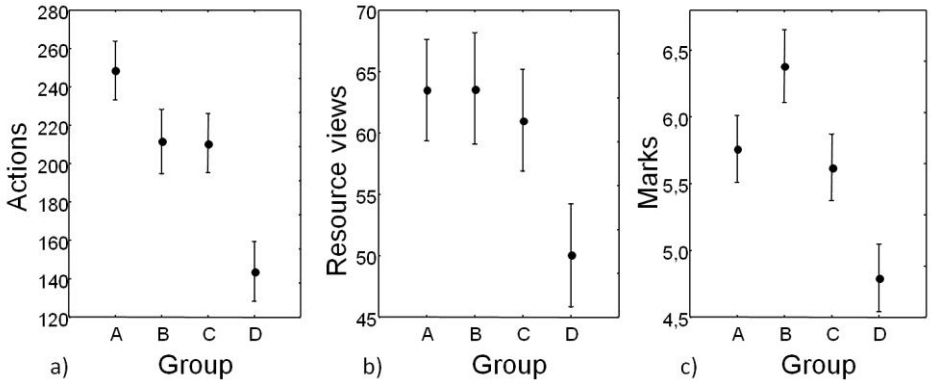

Figure 2. (a) Average number of actions; (b) average number of resource views; (c) average marks of the first subject obtained by students from different groups (Mean ± SE)

Regarding the last subject (Environmental Education) of the fourth year, a total of 4,204 actions were recorded in Moodle. The actions which have been most registered are resource view with 46% and course view with 39%, having other actions rates below 4%. The average actions done per student was 40.28 ± 29.17, as for the resource views an average of 11.07 ± 18.35, with average marks in this subject of 6.5 ± 1.54. There are significant differences between groups B and D in the number of actions ($F_{1,102}$ = 8.30; $p < 0.001$), in the number of resource views ($F_{1,102}$ = 3.62; $p < 0.001$) and also in the marks obtained ($F_{1,102}$ = 4.29; $p < 0.001$), with higher average values in the three variables in group B (Fig. 3).

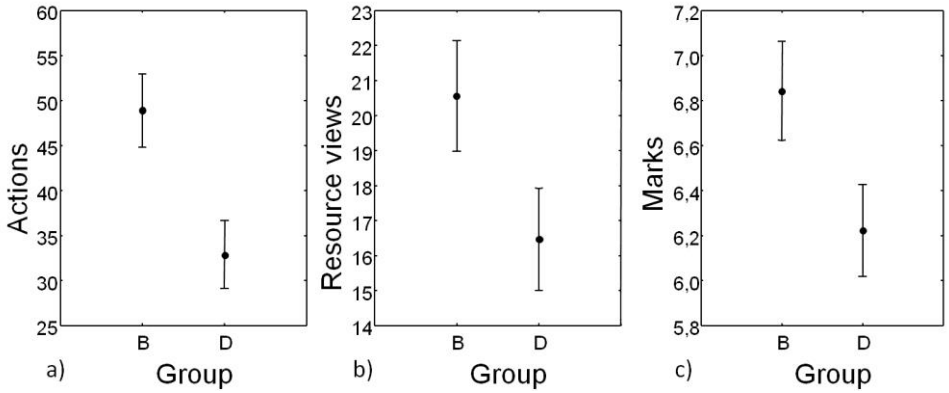

Figure 3. (a) Average number of actions; (b) average number of resource views; (c) average marks in the last subject obtained by students from different groups (Mean ± SE).

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By performing a General Regression Model (GRM) of the two subjects (Natural Knowledge and Environmental Education), marks as a dependent variable and as continuous independent variables: actions and resource views and as factors: group and subject, we obtain in the first stepwise regression a non-significant resource views relation ($F_{1,226}$ = 0.02; p = 0.8). The General Linear Model (GLM) excluding this variable it's a better model (adjusted R^2 = 0.16; $F_{4,227}$ = 12.59; p < 0.001) that shows a significant positive relation with actions and in which the differences between group and subject are maintained (Table 1).

Table 1. Results of the general linear model (GLM) of marks of B and D students groups in both subjects as dependent variable and as independent variable actions and as factors group and subject

	Degr. of - Freedom	MS	F	p
Intercept	1	2628.508	653.683	<0.001
Actions	1	57.008	14.177	<0.001
Group	1	40.280	10.017	0.001
Subject	1	105.686	26.283	<0.001
Group*Subject	1	6.263	1.557	0.21
Error	227	4.021		

4. Discussion and conclusion

In this study we show that there is a high variability in the number of actions performed by students in Moodle, finding a positive relationship between marks in the subject and the number of actions in the virtual platform. Therefore, the number of actions performed by each student could be viewed as an indicator of their interest in the subject, which is related to the mark eventually obtained in this, having been shown in other studies the possibility of making predictions about being able to overcome a subject based on interactions with students performing manager courses (Delgado Calvo-Flores et al., 2006; Romero et al. 2013).

Most learning management systems generate activity logs of students which can be used to harness this potential by tools to do so (Mazza y Milani, 2005; Zhang et al., 2007; Black, Dawson y Priem, 2008), although it would be more useful if those systems develop preliminary analysis and graphs automatically. If the results indicate a reduced use of the platform, teachers can act accordingly before the end of the course.

The actions most performed have been to access the platform of the

subjects and the resource views, as in other learning platform studies (Torres, Prieto y Lopez, 2012). We found differences in the use of Moodle between groups, with lower total use per group and a smaller number of actions per student in the group that got a lower score in the subjects. This shows that the use of the platform can be an indicative of motivation on the subjects. Also, years later, these differences between groups remain, indicating that measures could be taken on these unmotivated groups, which can be detected during the first year of college, and act accordingly in the following academic courses.

The "Reports" option of Moodle can be considered a useful tool that provides information about the students and allows evaluation of student interaction with the subjects, which can be exploited by the teacher as an indicator of student motivation.

We understand, therefore, that data related to the use of the platform by students are a good measure of their motivation to learn a certain subject. They can be used as a predictor of marks of one group or one student.

These results encourage us to pursue this line of work, designing a study with more groups of students, collected during several years to analyze trends and try to improve the predictive value of different actions, such as the relevant information could be extracted to anticipate the needs of the students presented during the process of learning a particular subject.

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