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USING SOCIAL NETWORK AND DROPBOX IN BLENDED LEARNING: AN APPLICATION TO UNIVERSITY EDUCATION

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Abstract. The main objective of this study is to analyze the use of the Social Networking and dropbox in blended learning by University students. We try identifying this method, over the student's performance. The results show that the implementation of blended learning has a positive effect on in learning outcomes. The use of the Knowledge Management process has enabled captures a three-factor structure that reflected the five types of knowledge. The segmentation of the student sample analyzed using cluster technique, has established a clear typology of four groups. Students with higher levels of learning are related to the increased use of resources used and more proactive in blended learning.

Keywords: social networking, dropbox, blended learning, student, university.

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JEL classification: I23.

1. Introduction

The entry into the XXI century has provided a new mode of social organization, linked to a technological revolution with its epicenter in the technologies of information and communication technologies (ICTs). The events that are occurring worldwide are proof of this revolution. Social networks (SN) account for access to a large amount of educational resources which enable teaching and learning of unlimited capacity. As mention (Escobar-Rodriguez, Monge-Lozano 2012) ICTs acceptance in education remains a central concern of information systems research and practice. Research on student learning in higher education has systematically provided evidence for the inter-relational nature of the different aspects of student learning, such as conceptions of learning, approaches to learning and learning outcomes (Bliuc, Ellis, Goodyear, Piggot 2011). ICTs in the educational field pose a significant transformation in the teaching methods, giving way to virtual environments, where the learning process is based on interactivity to educate

students, leading to the acquisition of new skills. In parallel with the increasing use of ICTs, the European Space for Higher Education has led to growing concerns about a new model of teaching / learning, student-centered. Concepts such as "skills or abilities" emerge as relevant and key criteria in the new approach to higher education.

In line with authors such as (Amhag, Jakobsson 2009; So, Brush 2008; Wheeler, Yeomans, Wheeler 2008; Wolff 2010; Biasutti, EL-Deghaidy 2012) social constructivist learning theory was used as a theoretical framework with a shift from a teacher-centred methodology to a student-centred methodology. In this framework, the main objective of this paper is to analyze the use of the SN and dropbox in blended learning by University students. We try identifying this method, over the student's performance (learning outcome). Following (Levy, Dickerson, Teague 2010) while pedagogical developments and research were largely focused on e-learning, the beginning of this century saw the emergence of the concept of blended learning. Bliuc (Goodyear, Ellis 2007: 4) state that "blended learning" describes learning activities that involve a systematic combination of co-present (face-to-face) interactions and technologically-mediated interactions between students, teachers and learning resources'. As mention (López-Pérez, Pérez-López, Rodríguez-Ariza 2011) the success of blended learning is not only the result of the simple integration of ICTs with the FTF approach (De George-Walker, Keeffe 2010). In situations where student numbers by classroom are high, this type of resource provides greater opportunities to comprehend and extend the knowledge presented (Osguthorpe, Graham 2003; Singh 2010). The use of blended learning resources may produce changes in learning patterns and practices.

We integrate the Knowledge management (KM) as a design tool because of the pedagogical importance that is reaching (Yeh, Huang, Yeh 2010). As mention this authors KM involves knowledge sharing, creation, validation, presentation, distribution and application (Bhatt 2001; Holm 2001). Recent studies have used KM (Yeh, Huang, Yeh 2011; Biasutti, EL-Deghaidy 2012).

2. Methods

In this section, we present the participants, the resources and methods used to determine whether the objectives of this study have been achieved.

2.1. Participants

The participants were sophomores of Economics and Business Administration, in the course of Operations and Business Processes. Table 1 shows the technical details of the survey. They had to perform work in a group. The work accounted for 50% of the note. The other 50% was the final exam with 40%, the remaining 10% of individual work. The work was involved in the manufacturing process of a product or service.

Table 1. Technical details of the survey (Source: created by the author)

Analysis unit	Students enrolled in second course of Economics and Business Administration, in the subject of Operations and Business Processes
Geographical scope	University of Alcala (Madrid)
Population	98 students enrolled in the 2012 course
Sampling type	For convenience
Sample size	82(83,6%) students
Sampling error / confidence interval	4,6% (95%); p = q = 0.5
Measuring instrument	Individual survey
Date embodiment	May 2012

Students had to incorporate the various concepts and techniques studied during the course. For example, determining the project network (CPM, PERT), plant layout, production planning, etc. Students studying and working also independently proposed themes and concepts. The sum of these activities was evaluated in a final mark. As mention (López-Perez *et al.* 2011) learning outcomes are of a multi-dimensional nature; they may reflect acquired skills and competences, and knowledge received, or be measured by students' experiences or by their degree of satisfaction. The final marks has been used as a measure learning by (Broad *et al.* 2000; Drennan, Rohde 2002; Dowling *et al.* 2003; López-Perez *et al.* 2011) among others.

Demographic information was collected on participants` gender, access to the internet, hourly of daily Internet usage and its purpose, in addition to previous experience with social networks and dropbox. Tables 2 and 3 shows participants´ demographic data and opinion the work done, resources and support received by the teacher.

Table 2. Demographic data for participants (Source: created by the author)

Variable	%	
Gender	Male = 34.1%	Female = 65.8
Hours of daily internet usage	>1 h = 14.6%	
	1-2 h = 46.3%	
	3-4 h = 23.1%	
	<4 h = 15.8%	
The purpose for internet access	Education = 15.8%	
	Personal = 39.0%	
	Both = 45.1%	
Previous experience with social networks	Yes = 32.9%	No = 67.0%
Previous experience with dropbox	Yes = 9.7%	No = 90.2%

Table 3. Student´s opinion about work done, resources used and support received by the teacher (Source: created by the author)

Item	Mean	SD	Min.	Max.
The work helps to understand the subject	4.49	0.74	2	5
The work done increases the interest in the subject	4.16	0.88	1	5
The teacher support was necessary	4.06	0.93	2	5
Using Dropbox we has allowed both a greater degree of cooperation and learning.	3.98	1.01	1	5
The information available on the network, I have been helpful (links, videos, files, etc.)	3.93	1.04	1	5
Using Dropbox with the teacher has improved the work	3.89	1.11	1	5
Interaction with network messages Openet has been interesting	3.59	0.98	1	5

2.2. Resources

2.2.1. Social network

We have created a SN (http://openet.mixxt.net) to facilitate interaction between students and between them and the teacher. The SN can be used for different purposes, but have a common and important initiative of maintaining existing social ties and / or form new connections between users (Cliff *et al.* 2006; Ellison *et al.* 2006; Boyd & Ellison 2008). Although students were encouraged to search for software, documentation, videos, the network has a wealth of information fostering especially the use of free software (Openproject, WinQSB, Day, Sistrat, etc.).

Figure 1 shows an image of the network and the evolution of interactions of the participants over time. We use software UCINET v. 6 (Borgatti *et al.* 2002) for the representations.

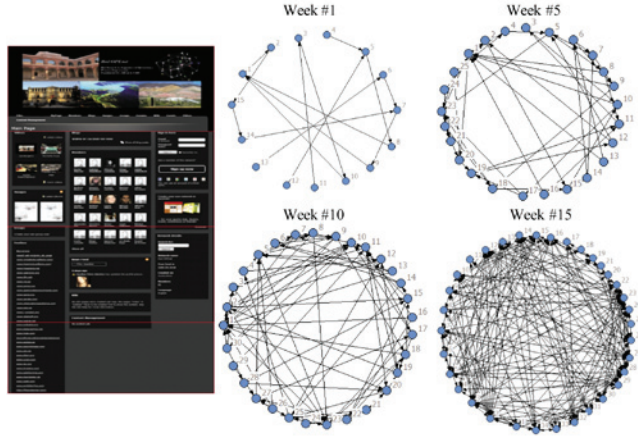


Fig. 1. Evolution of the interaction of the participants in the network (Source: created by the authors)

2.2.2. Dropbox, web and classroom

Using dropbox, the working groups kept the different versions of the work. It could also access the results of the computer programs used by students. The teaching material was accessible through a website (or WebCT). In classroom, explaining both concepts and practical and discussed issues related to work. Figure 2 shows the network structure (simplified) of the working groups and dropbox and with the classroom.

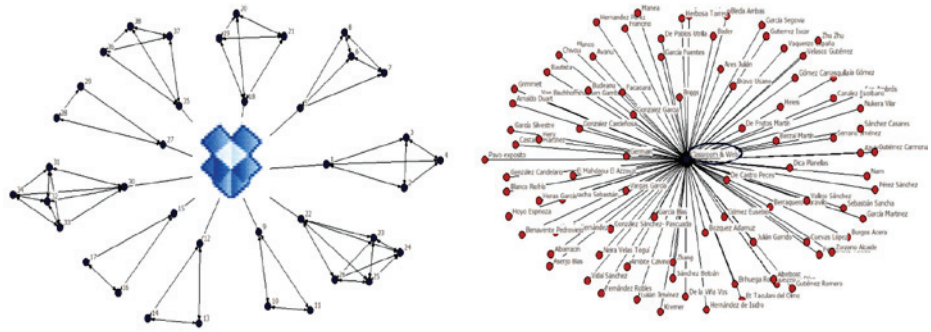


Fig. 2. Connecting workgroups and dropbox Classrom and web

One closed question instrument were used to assess the results and the processes induced by the SN and dropbox in the activities. The questionnaire was structured into two blocks. One is about the demographics and opinion the work done, resources and support received by the teacher (see Tables #1 and #2). The other for assessing the application of Knowledge Management (KM) processes. This instrument has been used recently by (Yeh, Huang & Yeh 2011; Biasutti, EL-Deghaidy 2012). A developed description of the relationship between KM and education can be found in these authors.

First we apply the factor analysis; we can find five types of knowledge within KM. As mention Biasutti and EL-Deghaidy (2012: 863); *Knowledge acquisition* refers mainly to the strategies, tools and methods that could be used in order to finding and acquiring information. *Knowledge internalization* after information has been found and accessed, the next step is linking this information into previous mental schemata. *Knowledge creation* considering previous knowledge, it starts from the collection of existing knowledge, ending with storage process and passing by processes of coding and classification of knowledge. *Knowledge sharing* process is the key to enhance the externalization and dissemination of knowledge. *Knowledge application and innovation process* represents the stage where decisions are made and is the ultimate goal of KM. It refers to the process of applying what one has learned to the job at hand. Second we apply cluster analysis for form groups of students with homogeneous characteristics, but different among the groups, for which a cluster analysis is appropriate.

3. Results and discussions

According (Voss 2003) blended learning is a recent development in education, combining face-to-face classes with e-learning modules. Some authors mention the advantages of applying this methodology in relation with didactic flexibility or reducing costs, especially compared to traditional classes a large number of students (Woltering, Herrler, Spitzer, Spreckelsen 2009). As mention (López-Perez, Perez-López, Rodriguez Ariza 2011) previous studies have reported that the quality and results of learning are affected when students utilize only such methods, possibly due to a) the lack of interaction with the teacher and other students (Laurillard 1993); b) procrastination in asynchronous learning (Lim 2002); c) the reduced motivation to read learning materials online (Lim, Kim 2003).

In our case we assume that the use of blending learning will be a positive effect on to students. In particular, as a result of factors such as utility (Ozkan, Koseler 2009). Students overcome the difficulties of the resources available and also perceive their utility. His work thus becomes something encouraging and satisfactory. The motivation to learn is one of the variables that have most often been studied in the field of education (Lim, Morris 2009).

Data collected through the questionnaire KM, were analyzed using statistical analysis (Factor analysis and cluster analysis). Alpha coefficients ranging from 0.80 to 0.91 were all above the 0.70 standard of reliability and the total Cronbach-α was 0.87. As is known, with factor analysis the aim is to obtain a new set of variables (factors), fewer in number than the original variables, which allows a clearer interpretation. Determining the number of factors to retain is, as (Rummel 1970) points out, in part discretionary, and is left to the researcher's judgement. However, and as (Stewart 1981) notes, we should mention that there are various criteria to help to decide the number of significant factors, such as retaining the factors with characteristic root or eigenvalue greater than 1, which is the criterion chosen in this work. The (Bartlett 1950) test allows us to reject the null hypotheses of no significant correlation ($\chi^2 = 4567.7$; $p = 0.000$), meaning that it is appropriate to carry out this analysis. Likewise, the KMO test = 0.84 is also suitable.

Following the criteria mentioned, we obtain 3 factors with and eigenvalue grater than1 (as can be see Table 4, whose explanatory power is 63.1%. The interpretation of these factors is carried out as a function of the variables with most influence in them, previously carrying out varimax rotation to help in the interpretation of the results. We use, depending on sample size, the cutoff value of 0.6 (Hair *et al.* 1999).

The first factor, which explains 46,7% of the variance, presents a high positive association with seven items in three group. First group of items #15, #14, #16 (I tried to bring out the best practices, I applied my knowledge to the activities, I have downloaded and adapted best practices to my activities) representing *knowledge application*. Second group of items #5 and #6 (I updated the job permanently, I rated the new information in an organized), representing *knowledge internalization*. Third group of items #2 and #3 (I have documented the type of information needed, I have summarized the results of Internet searches), representing *knowledge acquisition*.

Table 4. Rotated factor matrix: principal components and varimax with Kaiser normalized criterion (Source: created by the author)

Item	[a]Factor_1	Factor_2	Factor_3
(#1) Selected the appropriate information on the Internet	0.477	0.202	0.318
(#2) I have documented the type of information needed	**0.661**	0.279	0.351
(#3) I have summarized the results of Internet searches	**0.645**	0.182	0.181
(#4) I related the new information to prior knowledge	0.528	0.386	0.240
(#5) I updated the job permanently	**0.619**	0.358	-0.034
(#6) I rated the new information in an organized	**0.748**	0.075	0.244
(#7) I have assimilated new ideas	0.234	0.144	**0.893**
(#8) I have assimilated new concepts	0.281	0.257	**0.875**
(#10) I have developed new ways of learning	0.216	0.559	0.389
(#11) I have shared information with colleagues	0.169	**0.692**	0.182
(#12) I have shared the use of information with colleagues	0.219	**0.854**	0.034
(#13) I encouraged the idea of sharing knowledge	0.345	**0.777**	0.213
(#14) I applied my knowledge to the activities	**0.745**	0.365	0.141
(#15) I tried to bring out the best practices	**0.815**	0.129	0.134
(#16) I have downloaded and adapted best practices to my activities	0.693	0.232	0.236
Eigenvalue	7.01	1.27	1.2
% variance explained (63.1%)	46.70	8.4	8.03
KMO	8.4		
Alpha de cronbach/item	(0.85) 6	(0.80) 3	(0.91) 2

[a] Factors: 1. Knowledge application, internalization, adquisition, 2. Knowledge sharing, 3. Knowledge creation.

The second factor explains 8.04% of the variance, presents a high positive association with two items, #11 and #12 (I have shared information with colleagues, I have shared the use of information with colleagues) representing *knowledge sharing*. **The third factor** explains 8.03 of the variance, presents a high positive association with two items #7 and #8 (I have assimilated new ideas, I have assimilated new concepts) representing *knowledge creation*.

In summary the number of factors extracted in our work is three. The first factor is the more representative bringing together three of the skills included in KM. This result differs somewhat from that found by Biasutti and EL-Deghaidy (2012), they found the five knowledge, identified in five factors. However, in their work is not mention how is the Number of factors choice. Also, it depends of sample size.

We now seek to form groups of students with homogeneous characteristics, but different among the groups, for which a cluster analysis is appropriate. The clustering method

used Ward (1963) is adopted, which merges clusters which contribute the least to the overall sum of the squared within cluster distances. Clustering proceeds by finding the closest pair of clusters, combining them into a new larger cluster, and then computing the distance between this and the other remaining cluster. The process starts with every student treated as a single cluster, so the first new cluster will be a two-student cluster, and so on. Clustering ceases when the two final clusters have been combined, so that all the data are in one cluster. The final results of this analysis are reported in Table 5.

Table 5. Mean values obtained for each group (Source: created by the author)

Cluster	Nº obs.		Factor #1	Factor #2	Factor #3
#1	27	Mean	21.39	14.58	12.86
#2	25	Mean	29.07	20.29	17.06
#3	22	Mean	24.65	17.78	15.29
#4	8	Mean	12.7	8.87	8.42
Total	82	F(value)	132.2**	106.9**	109.8**

**P<0.01

Finally, the discriminant analysis verifies the classification of the groups, with 98.78% of the cases correctly classified (Wilks lambda = 0.116 (p-value = 0.000)). Furthermore, the ANOVA confirms the statistically significant differences between the clusters with respect to the factors (Table 3). The interpretations of the results obtained by applying the ward algorithm and the mean values obtained in Table 3 allow us to characterize the four groups. Cluster #2 shows the highest average values in the three factors, while the cluster #4 lowest average values. Clusters #2 and #3 are positioned in an intermediate zone.

To complement the analysis of the cluster. Figure 3 shows the mean values of the original variables in relation to the cluster. As expected this result is the same as that carried out the factors but perhaps more clearly.

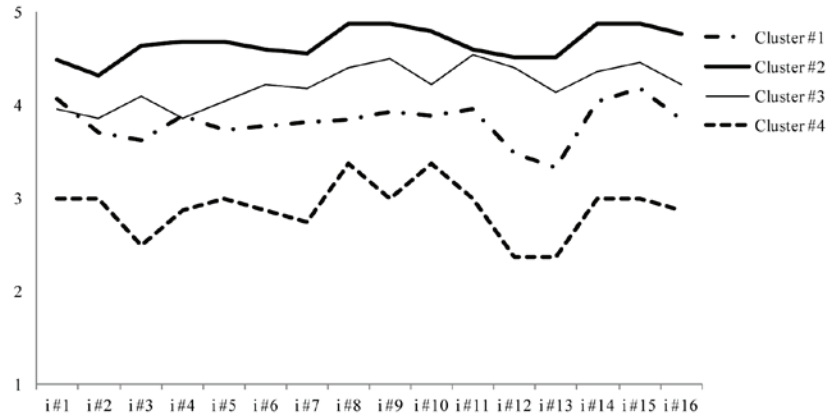
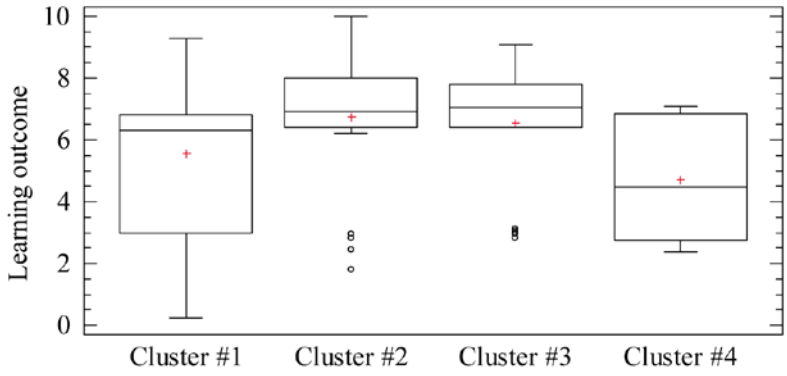


Fig. 3. Mean values of the original variables and cluster (Source: created by the authors)

One of the key aspects in the experiment carried out, was to determine the relation of the attitude of students to use available resources (SN, dropbox) in blended learning and learning outcomes. For this, we use an ANOVA analysis. The results show that the cluster # 2 gets the highest academic performance (mean = 6.75, sd = 4.62 on a scale of 0–10 points) compared to the rest cluster #3(mean = 6.53, sd = 4.37); cluster #1 (mean = 5.54, sd = 5.18); cluster #4 (mean = 4.70, sd = 4.75). Figure 4 provides information of the boxplot of the cluster according to academic performance.



F-test = 3.03(0.034)

Fig. 4. Academic performance by cluster (Source: created by the authors)

4. Conclusions

The increasingly common use of innovative contexts of learning that integrate online and face-to-face learning experiences at all levels of education highlights the need to intensify our research focus on key aspects of these experiences from a student perspective, such as students' experiences of blended learning, online discussions or Internet-based research (Tsai 2004).

The experiment carried out in this work using the SN and dropbox in blending learning, was conducted to promoting autonomous, collaborative and proactive learning of the students. We try identifying this method, over the student's performance (final marks). The results shows that the implementation of blended learning has a positive effect on in learning outcomes (raising exam+work pass rates) in the subject.

The use of the KM process has enabled capture a three-factor structure that reflected the five types of knowledge. Factor # 1 (Knowledge application, internalization and acquisition) seems the most relevant, as it is that most of the variance explained. Knowledge sharing factor is second in importance thus indicating the importance that the SN has to get this process. Factor 3 shows the creative knowledge. In this respect, teamwork, sharing of ideas and interaction with the professor has improved the learning process. As mentioned Biasutti and EL-Deghaidy (2012) the effectiveness of KM requires a continuous knowledge conversion process between tacit and explicit knowledge (Nonaka, Takeuchi 1995).

The segmentation of the student sample analyzed using cluster technique, has established a clear typology. Considering the cluster and in relation to factors and original variables has been possible to identify four clusters. Cluster # 2 integrated of students who have higher levels of knowledge recognized in the KM process. Furthermore, these students are those with the highest learning outcome. Cluster # 4 composed of students from lower level of knowledge in KM and lower learning outcome. Clusters # 1 and # 3 whose values are in the middle tier.

The need to improve the system imposed by ECTs in Europe in general and Spain in particular is in engagement when the number of students per classroom is excessive. The use of ICTs can help improve this process by allowing more interaction between students and the teacher and ultimately improve the necessary process of student´ learning.

Active use and social of SN cannot be ignored in the pacification of teaching. A high percentage of young people, make daily use of social networking, sharing photos, music, messages, etc. How to harness that potential in education is the great challenge.

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