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New model, to evaluate the implementation of LMS in institutions at a higher level, through the supplies of the student

Nuevo modelo, para evaluar la implementación de LMS en instituciones a nivel superior, mediante los insumos del educando

JUAREZ-SANTIAGO, Brenda[1,2]*†, OLIVARES-RAMIREZ, Juan Manuel[1,2], FERRIOL-SANCHEZ, Fermín[1] and LEDESMA-URIBE, Norma Alejandra[2]

1Universidad Internacional Iberoamericana, Campus México
2Universidad Tecnológica de San Juan del Río

ID 1st Author: *Brenda, Juarez-Santiago* / **ORC ID:** 0000-0001-9071-9243, **Thomson ID:** F-7396-2017, **CVU CONACYT ID:** 511613

ID 1st Coauthor: *Juan Manuel, Olivares-Ramirez* / **ORC ID:** 0000-0003-2427-6936

ID 2nd Coauthor: *Fermín, Ferriol-Sanchez* / **ORC ID:** 0000-0003-4138-8999

ID 3rd Coauthor: *Norma Alejandra, Ledesma-Uribe* / **ORC ID:** 0000-0002-2512-892X, **CVU CONACYT ID:** 673202

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Abstract

The information and communication technologies-ICT, have more use with the implementation of Learning Management System-LMS; The present study was carried out to evaluate the use of four LMS in a university, to identify acceptance and performance, through the student's inputs, the LMS used: Edmodo, Classroom, Schoology and Moodle, the methodology consisted of 4 stages; 1) LMS selection, 2) conFiguretion LMS, 3) evaluation of acceptance factors and 4) calculation of statistical coefficients. The results obtained from the four LMS, Google Classroom in its conFiguretion has the highest level of performance, with an average of 73%; while for the statistical coefficients; Of seven factors evaluated for the level of acceptance, those with the greatest preference for the learners were System Factors FS (82%), Anxiety and innovationAI (80%) and Virtual Library BV (43%).

Learning Management System LMS, Evaluation, Model, Information and Communication Technologies (ICT)

Resumen

Las tecnologías de la información y comunicación-TIC, tienen mayor uso en la educación, con la implementación de Learning Management System-LMS; el presente estudio se realizó para evaluar el uso de cuatro LMS en una universidad, para identificar la aceptación y desempeño, mediante los insumos del educando, los LMS utilizados: Edmodo, Classroom, Schoology y Moodle, la metodología consistió en las siguientes 4 etapas; 1)selección de LMS, 2)conFigureción LMS, 3)evaluación factores de aceptación y 4)cálculo de coeficientes estadísticos. Los resultados obtenidos de los cuatro LMS, Google Classroom en su conFigureción tiene el mayor nivel de desempeño, con un promedio del 73%; mientras que para los coeficientes estadísticos; de siete factores evaluados para el nivel de aceptación, los de mayor preferencia por los educandos fueron Factores del Sistema FS (82%), Ansiedad e innovación AI (80%) y Biblioteca virtual BV (43%).

Sistemas Gestores de Aprendizaje (LMS), Evaluación, Modelo, Tecnologías de la Información y Comunicación (TIC)

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*Correspondence to author (Email: brendajuarezs@gmail.com)
†Researcher contributing as first Author.

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Introduction

Currently, Information and Communication Technologies (ICT) have become a strategy for universities in the development of the teaching-learning process, generating in students Personal Learning Environments (PLE, Personal Learning Environment), (Humanante, García , & Conde, 2015); With the use of ICT, students have the opportunity to study outside the university site, without requiring a physical meeting between teachers and students using an e-learning model (Masud, 2016), which has great advantages in which services can be offered. academic, through a Learning Management System (LMS), which allow the administration of courses taught at universities.

Different investigations have been carried out to identify the ability to dynamically create a Virtual Learning Environment EVA (VLE, Virtual Learning Enviroment), (Raaij & Schepers, 2008); (de Jesús, & Gabriel ,, 2020) I use the EVAs through the "Moodlecloud" platform, in order to promote the achievement of learning.

(Pineda López, 2020) I generate didactic strategies in virtual methodology for online teachers, which allows the continuous improvement of the teaching-learning processes in virtual education.

The third generation of LMS (Dagger, O'Connor, Lawless, & Walsh, 2007) that refer to "the strategy of using technological resources through Web 2.0, which plays an important role in the use of resources through ICTs external to the LMS and that allow students greater interaction, with the "e-learning model" (Oprea, 2014) and "Through the use of technology, new learning environments have been generated, which facilitate the performance of academic activities and improve the performance "(Soto, Martinez, & Otero, 2009).

While for (Rivera, & Dayan, 2020) the use of technological mediations, allow to increase the quality in the teaching-learning processes, and (Rosa, Riaño, & Rodríguez, 2020) observed that academic work is more productive for young people through the use of technological tools and collaborative work.

There are previous qualitative research of LMS (Dagger, O'Connor, Lawless, & Walsh, 2007), (Liaw, 2008), (Piccoli and Adhmad, 2009), (Al-Busaidi & Al-Shini, 2010), (Sumak, Hericko, Pusnik, and Polancig, 2011), (Shu-Shen, 2013), (Humanante, García, & Conde, 2015) (Ahmad, 2015) and (Ramirez, Sabat, Audet, & Lordan, 2017), without However, no systematic quantitative studies have been found that point to a model for evaluating the acceptance and performance of LMS.

Evaluation studies are found; of the use of technology are: Technology Acceptance Model (TAM, Technology Acceptance Model), (Davis, 1989), its purpose is to determine the factors of the use of ICT, and is based on the Theory of Reasoned Action (TRA, Theory of Reasoned Action) (Ajzen & Fishbein, 1980); Unified Theory of Acceptance and Usage of Technology (UTAUT) (Venkatesh, Morris, & Davis, 2003).

The authors (Yong Varela, Rivas Tovar, & Chaparro, 2010), observed in their study "that the use of TAM has been very supportive in predicting when a system should be implemented, and they conclude that students as they advance in their professional careers, they increase the use of ICT "(2010, p.202).

It is necessary to highlight the constructs that define the TAM model: Behavioral Intention (BI): It is the degree to which a person has expressed behaviorally, whether or not they plan to use a specific technology; Attitude Towards Using (A): An individual's negative or positive feeling about the performance of the objective behavior, for example, using an information system; Perceived Uselfulness (PU): The degree to which a person believes that the use of the system will help them achieve progress in the performance of their work; Perceived Ease of Use (PEU): The degree of ease associated with using the system or technology.

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In this study, the constructs of (Ajzen & Fishbein, 1980) and (Davis, 1989) were used for (Raaij & Schepers, 2008) in their study on ELV applying TAM and as evaluated variables; A, PU and PEU; while in a PLE study the variables were: PU, PEU, (Humanante, García, & Conde, 2015); On the other hand, and taking into account that ICTs have boomed with the use of mobile devices in recent years, the m-learning model has been studied in the LMS (Ahmad, 2015), using the TAM and UTAUT models, with variables A, BI, PU and FC Condition Factors. The conclusions of the author Ahmad (2015) is that "reality indicates that not all the scope is available to cover the acceptance aspects of mobile use in education, for this reason he describes that there is still much to investigate and contribute to the models for the use of technology in educational centers "(Ahmad, 2015).

On the other hand, studies indicate that LMS must have support resources for students, one of them is the virtual library to study outside the university (Mee, 2013). The study by (Leppisaari, 2012) stated that a well-designed Online Learning environment allows increasing student learning. For (Junfeng Yang, 2014) shows in his study that to obtain strategies for collaborative online learning which used a mixed methods research method using questionnaire, interview and content analysis, the findings could explain the fact that the Collaborative Computer Learning, (CSCL, Computer Supported Collaborative Learning), (Huang, Zhang, Chen, & Xu, 2007).

For (Navarro, Cristóbal, & Fernández, 2011) they indicate that the design, development and maintenance of large virtual campuses that are used for e-learning are complex issues.

The analyzed work of Navarro et al., In their architectural proposal was based; in software architecture; detailed software design; and hardware architecture. While, for the study of Yábar, López and Castella (2007) describe that virtual campuses perform various functions: they provide support for teaching through virtual forums, and they promote teaching innovation, they promote communication between different users.

There is previous research on LMS. Edmodo is a free option LMS for educational centers, where the corporate author presents elements of support for the interaction of learning, with online tools of free access (Edmodo, 2018), that previous investigation (Sáez & Fernández, 2012), indicate that the use of Edmodo allows evaluating student learning through the elements that the corporate author Edmodo provides on his platform, Google Classroom is an LMS that in its study (Iftakhar, 2016) supported by the theory of (Rogers, 2010), by applying a survey to students evaluated the use of Classroom in their learning, in Classroom its corporate author indicates that it is perfect for work inside and outside the classroom; online, this platform has different tools, virtual. Schoology (Friedman, Hwang, & Kindler, 2009), its objective was to create a learning strategy for students and motivate students to study online, resources from external platforms can be integrated, it presents statistics on the progress of each student and is a free platform use (Schoology, 2018)

There are studies for the implementation of ICTs, with experimentation on groups of students, calculating by statistical coefficients the factors of systems that support e-learning, with interactive virtual campuses, informative websites and LMS, in isolation they are evaluated with the Cronbach's Alpha coefficients, (Cronbach, 1951), to know the level of reliability, and the correlation coefficient to identify the correlation of the evaluated factors. The author (Armas Jaramillo, 2020) used quantitative research to assess the quality of work using the Cronbach coefficient.

Methodology

Figure 1 shows the methodology that was carried out in four stages.

Figure 1 Research model
Source: self made

In the first stage, a selection was made of four LMSs that would be implemented in the higher institution: Edmodo, Schoology, Google Classroom and Moodle, all of which are free for institutions and students.

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In the second stage, the configuration of each LMS was carried out with the data of the institution, where the registration was made with the name of the university, and user accounts were created with the name of the university, as well as the creation of a administrator type account for each LMS, which allowed to be the manager of the students for their registration and of the teachers who used the LMS platforms.

The third stage was the evaluation of seven factors that were obtained, from the literary review of previous investigations, where the constructs that other researchers used to evaluate the LMS that they investigated were reviewed, thus achieving a bank of questions for the students. Participants through questionnaires, which were created in the application of Google forms, with the Likert type response from 1 to 5. Where 5 was totally in agreement, and 1 totally disagreed, with the results obtained, the mean was calculated. of each factor using Equation 1, which allowed identifying the value that allowed acceptance of each of the four LMS.

$$\tilde{X} = \frac{\sum_{i=1}^{N} Xi}{N} \quad (1)$$

Where: $\tilde{X}$ is the value of the average, the sum of all the answers obtained in the questionnaire.

N: the total number of x.

i: the consecutive number up to the value of n.

∑x = Sum of x

Stage four, using the results of the questionnaires obtained, performed the statistical calculations with Equation 2, the coefficient of variation, the coefficient of reliability and the correlation coefficient

$$\propto = \frac{K}{K-1}\left[1 - \frac{\sum S_i^2}{S_T^2}\right] \quad (2)$$

Where: ∝ = Cronbach's alpha reliability coefficient, K = The number of items, S_i ^ 2 = Sum of item variances, S_T ^ 2 = Variance of the sum of items.

Where the evaluation scale was determined: Alpha coefficient> 0.9 is excellent, Alpha coefficient> 0.8 is good, Alpha coefficient> 0.7 is acceptable, Alpha coefficient> 0.6 is questionable, Alpha coefficient> 0.5 is poor, Alpha coefficient <0.5 is unacceptable Equation 3 was used for the coefficient of variation, where the variable was found to identify the variation of each factor, in LMS.

$$C.V = \frac{\sigma}{\bar{x}} \quad (3)$$

Where: σ = Standard deviation, x = Arithmetic mean

The scale of variation: Accuracy from 0 to 0.25 is accurate, 0.26 to 0.50 acceptable precision, 0.51 to 0.75 regular precision, greater than 0.75 imprecise precision.

To obtain the correlation of the evaluated factors, Equation 4 corresponding to the correlation coefficient was used.

$$\rho x, y = \frac{\sigma xy}{\sigma x \sigma y} \quad (4)$$

Where: σxy = Covariance between xy, σx = Standard deviation of x, σy = Standard deviation of y.

Where the scale is as follows: Values close to 1 is direct correlation, values very close to 0 there is no correlation and values close to -1 inverse correlation.

In stage five, the analysis of the results obtained in this research, found in the results section, was carried out.

Results

LMS Selection. The results obtained in this investigation are presented below. The selection of the four LMS shows that they are platforms with their reliable official sites that offer the resources to educational institutions, while, for the private productive or industrial sector, the cost will depend on the users who use it.

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LMS Configuration. In the investigation carried out, the configuration for each LMS was obtained; registering the institution of the case study where the students identified the data in the four LMS, (Navarro, Cigarrán, Huertas, Rodríguez, & Cogolludo, 2014) I call it the presentation level, for this case it is also called the LMS presentation, It was observed that when the teacher shared the access code to the courses the students were 100% integrated, in the first three days the registration process started, this occurred due to the ease with which they found the process to register with the identified institution.

Assessment of Factors for acceptance of LMS. The factors that influence the LMS in a higher level institution in which it was more accepted in the students of the 6 courses are presented. Table 1 presents the factors evaluated in the four LMS.

Table 1 shows that LC obtained the greatest impact on FS with 82%, this is because the student generated a positive impact when using system resources, this result is consistent with the studies of (Taylor & Todd, 1995) and (Moore & Benbasat, 1996) where they indicate that the compatibility and ease of access to the system is of impact for the user with 60%, for the result of AI with 80% it is because the students were their first interaction with LC, for (Raaij & Schepers, 2008) with 82% and (Davis, 1989) (Moore & Benbasat, 1996) (Venkatesh, Morris, & Davis, 2003) with 84% in their variable of intention in behavior and self-efficacy, stand out that when the user initiates an interaction for the first time the behavior can be stress or can generate innovation.

LMS	Factors, %
L_C:Gloogle Classroom	FS, 82%,AI, 80% y BV, 50%
L_E: Edmodo	FS, 80%,AI, 77% y BV, 40%
L_S: Schoology	FS, AI, 80% y BV, 40%
L_M: Moodle	FS, AI, 80% y BV, 60%
Note: AI; Anxiety and Innovation, UU; use and utility, EA; Access Strategies, HA; Access Tools, FS; System Factors, BV; Virtual Library, UM; Mobile use.	

Table 1 LMS Acceptance Factors
Source: own elaboration

Likewise, the study by (Ahmad, 2015) uses its variables where it determines that innovation occurs when a system is used, the next impact factor was BV 43%, which allowed students to have access to libraries with academic resources to support the Study of the courses, for (Mee, 2013) determines that both teachers and students require that they be provided with the use of virtual library for online courses obtaining 70%, in exclusive use of 3 libraries that I use.

For LE, FS 80% was obtained because the APP was installed on their cell phones or direct use of the internet allowed easy access, AI 77% for being the first interaction and BV 40% because I integrated the material into the courses. For LM and LS they are presented in FS, AI and BV as in LC and LE, because the students evaluated access to their courses with greater weight, through the FS and AI because they showed a higher percentage, and BV was a third factor impact on your learning with the use of LMS. For this result, it was found that compared to the studies of (Shu-Shen, 2013) self-efficacy 50.5%, as described in being confidence in one's ability to achieve results, in its system quality variable 58% the first is comparable with AI 77% and the second with FS 80% in this study; There are more recent studies (Namkee, Mohja, Jinghui, & Kwan, 2014) assess anxiety at an impact of 90% and associate self-efficacy with 55%.

Evaluation of statistical coefficients for LMS performance

The result of the reliability, precision and correlation coefficients of the four LMS to know the best performance derived from the 6 courses that were used in the research, the study carried out showed Cα (Cronbach, 1951) even though it has been widely discussed in the literature on their level of confidentiality, for this study the values are comparable with (Humanante, García, & Conde, 2015) that in their study obtained Cα 0.83.

In Table 2, it is observed that for the collaborative virtual environment constructs, Cα 0.84 in communications and Cα 0.58 in level of consciousness, in the first 2 it is good reliability and in the third it is unreliable, for the investigation the Cα was for LC 0.79 and LS 0.75, for this study, acceptable reliability was determined according to the Cronbach scale.

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The highest Cα was presented in the C2 course with the use of LS in this course the students showed their acceptance of using the Ls for them it was interesting to generate a learning environment through virtual media, however, on the average of the coefficient of the Four LMS that show reliability, the highest average is LC with a value of 0.73, that is to say that for the 6 courses the Classroom LMS was the one with the greatest impact.

In the LE and LM results, reliability was not presented, this is because not in all the courses the reliable acceptance was obtained according to the Cronbach coefficient formula, and for the CV it was obtained in the C_6 with LE 0.25 of precision, and in the LC average 0.30 is the lowest average precision obtained, this is because the CV formula indicates that the acceptable precision of a statistical study must be no more than 30%. For the correlation coefficient C ρx the course that presented the acceptable correlation is C_6 with 0.17, in this case being positive it was an acceptable direct correlation.

The average obtained by LMS in the coefficients: in LC average of Cα 0.73 is acceptable in this LMS, students had the highest reliability by having their activities organized in the same space in the cloud through the drive and website.

CV 0.305 is accurate for the variation; the C ρx was not presented, this means that for LC the relationship of the questionnaires applied in the evaluation is independent. For LE, Cα did not present an acceptance level, CV0.470, C ρx-0.16; in the case of LM, Cα was not presented, CV0.307, C ρx-0.18; at LSCα0.70, CV was not presented, C ρx-0.17. The correlation that occurred in the LMS was very weak.

For (Pérez, Giampaolo, & Perazzi, 2014) they indicated that the precision they found predominates the value greater than 0.25, which they indicate is due to the lack of planning due to the error in the investigation levels. In this investigation, a result greater than 0.25, this indicates that you must have a strategy in planning possible errors in the LMS. In the study (Pulido et al, 2013) it was found that the correlation between the use of technologies and psychological variables, with correlation results of (-0-001), (0.122) and (0.001), with the LMS there is no relationship between factors.

Course	L_S	LMS	Cα	LMS	Cv	LMS	C ρx
C_1	**105**	L_C	0.73	L_E	0.69*	L_E	-0.46*
C_2	57	L_S	**0.79*****	L_C	0.32	L_E	-0.22
C_3	45	L_C	0.74	L_C	0.29	L_S	0.12**
C_4	45	L_S	0.67*	L_M	0.28**	L_S	-0.22
C_5	43	L_C	0.72	L_M	0.34	L_E	-0.18
C_6	79	L_S	0.75**	L_E	**0.25*****	L_E	**0.17*****

Note: LMS is presented in LC; LMS Classroom, LS; LMS Schoology, LE; LMS Edmodo, LM; LMS Moodle. For the courses: C1; office automation, C2; ISW, C3; CDSW, C4; STI, C5; ADPTI, C6; Integrative. Statistical coefficients: Cα; Cronbach-Reliability Coefficient, CV; Variation coefficient- Accuracy, C ρx; Correlation coefficient.
Metadata: MN; Name, MA; Author, MF; Date, MFo; Format. * highly significant value, ** value very significant, * significant values**

Table 2 Reliability, variation and correlation coefficients of the courses in the four LMS

Conclusions

In this investigation, it was possible to identify which of the four LMS had the highest acceptance in the inputs of the student, regarding the behavior of the evaluation indicators in the period from September 2017 to August 2018, it is evident that the highest reliability was presented in Classroom higher than 60% the average of the evaluation period, however for Schoology an average of 79% was presented only the period from September-December 2017, for the course of Software Engineering, this was due to the participation of social networks and session of chats among the participants, the precision indicator showed a decreasing behavior for Edmodo, going from 0.69% of the office automation course to 0.25% in software engineering due to the use of chat rooms that showed the effectiveness of Edmodo; the correlation indicator was presented in Edmodo with 0.17 and for Schoology 0.12 this indicator its behavior was more stable for the use of the LMS, it is clearly observed that the interaction between the participants with the external learning tools allowed to have a good correlation .

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Regarding the level of acceptance, it was shown that the system factors are mainly used to increase the use of the LMS, and that their behavior in the four LMS was greater than 80%, on the other hand, Anxiety and Innovation showed that users had a level not greater than 80% this indicates that the states of emotion of the participants did not affect performance but that it was more innovative to use the LMS, in the case of the Virtual Library the performance was presented for the LMS where they were used Different virtual Libraries that allowed external material to be studied for topics, in this case 30 virtual libraries were used, of which more than 50% were visited; while in the academic performance the greatest impact was presented for the Learning Tools with more than 85% for the use of social networks, chat rooms, video tutorials, support in increasing academic performance, in the case of Virtual Library and Mobile Use was greater than 80%, indicating that the Virtual Library was visited by more than 90% and the use of mobile phones exceeded 90%.

This research indicates that higher level institutions should pay more attention to the investment of internet service infrastructure in their campuses.

References

Ahmad, A. (November de 2015). Determining the factors influencing students' intention to use m-learning in Jordan higher education. *Computers in Human Behavior, Vol. 52*, pp. 65-71. doi:10.1016/j.chb.2015.05.046

Ajzen, I., & Fishbein, M. (1980). Understanding attitudes and predicting social behauior. Englewood Cliffs. N. J. Prentice Hall. *Experimental Social Psychology, Vol. 25*(No.2), pp.466-487. Obtenido de http://www.redalyc.org/pdf/805/80525205.pdf

Al-Busaidi, K., & Al-Shini, H. (2010). Instructors' acceptance of learning management systems: A theoretical framework. *Communications of the IBIMA*, pp. 245-276. Obtenido de http://www.ibimapublishing.com/journals/CIBIMA/cibima.html

Arciniegas, J., Vargas, A., & Balsassari, S. (2016). Analysis of metadata Schemas for Marking up Educational Content. *Formacion Universitaria, 9*(5), 1-12. doi:10.4067/S0718-50062201600050009

Armas Jaramillo,, R. (2020). La calidad de vida en el trabajo de las personas con discapacidad auditiva del Ministerio de Trabajo, sede Qito. Trabajo de titulación previo a la obtención del Título de Psicólogo Industrial. Carrera de Psicología Industrial. Quito. Obtenido de http://www.dspace.uce.edu.Eq/handle/25000/20682

Castro, G. L., & López, M. G. (2013). An International Analysis of the Extensions to the IEEE LOM V1.0 Metadata Standard. *Computer Estandards & Interfaces, 35*(6), 567-581. doi:10.1016/j.csi.2013.04.006

Cheng, S.-I., Che, S.-C., & Yen, D. C. (2015). Continuance Intention of E-Portfolio System: A Confirmatory and Multigroup. *Computer Standards & Interfaces*. doi:doi: 10.1016/j.csi.2015.03.002

Cronbach, L. (1951). Coeficiente alfa y la estructura interna de pruebas. (Springer-Verlag, Ed.) *Psychometrika, 16*(3), 297.334. doi:https://doi.org/10.1007/BF02310555

Dagger, D., O'Connor, A., Lawless, S., & Walsh, E. (2007). Service-Oriented Elearning Platforms from Monolithic Systems to flexible services. *IEEE internet Computing, Vol. 11*(Num. 3), pp-28-35. doi:10.1109/MIC.2007.70

Davis, F. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly, Vol. 3*(No. 3), pp. 319-340. doi:10.2307/249008

de Jesús, , G., & Gabriel,, A. (2020). El entorno virtual de aprendizaje como herramienta pedagógica para la enseñanza de la asignatura de Español en una Telesecundaria Unitaria. Obtenido de https://hdl.handle.net/20.500.11777/4520

Dublin Core Metadata Initiative. (25 de septiembre de 2015). *http://dublincore.org/*. Obtenido de http://dublincore.org/documents/dcmi-terms/

ISSN 2410-3977
ECORFAN® All rights reserved

Edmodo. (26 de Octubre de 2018). *www.Edmodo.com*. Obtenido de https://www.edmodo.com

Ferran, N., Casadesús, J., & Krakowska , J. (2007). Enriching e-learning metadata through digital library usage analysis. *The Electronic Library, , Vol. 25*(Issue: 2,), pp.148-165,. doi:10.1108/02640470710741296

Friedman, J., Hwang, R., & Kindler, B. (2009). *Google Libros*. Obtenido de https://books.google.com.mx/books?id=agUtBgAAQBAJ&pg=PA133&lpg=PA133&dq=por+Jeremy+Friedman,+Ryan+Hwang,+Tim+Trinidad+y+Bill+Kindler+(2009)&source=bl&ots=jXVwPzlv9X&sig=ACfU3U24_vFSso13OTbA2OMN2qKqtjQD2g&hl=es-419&sa=X&ved=2ahUKEwjBpLekqrngAhUE0awKHRx4Bkw

Fu-Yun, Y., & Kuan-Jhug, P. (2014). The Effects of Student Question-Generation with Online Prompts on Learning. *Educational Technology & Society,, 3*(17), 267-279.

Google Classroom. (26 de octubre de 2018). *Classroom Google*. Obtenido de https://classroom.google.com

Huang, R., Zhang, Z., Chen, G., & Xu, C. (2007). Online learning: Does learning really happens: Comparison of Chinese and British online learning in intercultural context (in Chinese. *Open Education Research, 13*((6)), pp-12-24.

Humanante, P. R., García, F., & Conde, G. M. (27 de January de 2015). Personal Learning Environments and Online Classrooms: An Experience with University Students. *IEEE Revista Iberoamericana de Technologias del Aprendizaje, Vol. 10*(Issue 1), pp.26 - 32. doi:10.1109/RITA.2015.2391411

Iftakhar, S. (Febrero de 2016). Google Classroom: What Works and how? *Journal of Education and Social Sciences, Vol. 3*. Obtenido de http://jesoc.com/wp-content/uploads/2016/03/KC3_35.pdf

Institute of Electrical and Electronics Engineers. (01 de 03 de 2015). *IEEE Learning Object Metadata (LOM) [Internet]*. Recuperado el 27 de junio de 2018, de http://www.ieeeltsc.org/

Junfeng Yang, K. H.-J. (2014). Strategies for Smooth and Effective Cross-Cultural Online Collaborative Learning. *Journal of Educational Technology & Society, Vol.17*(No.3), pp.208-221. Obtenido de https://www.jstor.org/stable/jeductechsoci.17.3.208

Leppisaari, I. &. (2012). Modelling digital natives' international collaboration: Finnish-Korean experiences of environmental education. *Educational Technology & Society, Vol. 15*(Núm. 2), pp. 224-226. Obtenido de http://www.ifets.info/download_pdf.php?j_id=55&a_id=1243

Liaw, S.-S. (2008). Investigating students' perceived satisfaction, behavioral intention, and effectiveness of e-learning: A case study of the Blackboard system. *Computers & Education, Vol.51*(No. 2), pp. 864-873. doi: 10.1016/j.compedu.2007.09.005

Masud, M. (August de 2016). Collaborative e-learning systems using semantic data interoperability. *Computers in Human Behavior, Volume 61*, Pages 127-135. doi:https://doi.org/10.1016/j.chb.2016.02.094

Mee, S. (2013). Outreach to International Campuses: Removing Barriers and Building Relationships. *Journal of Library & Information Services in Distance Learning*, 1-12. doi:10.1080/1533290X.2012.705173

Moore, G., & Benbasat, I. (September de 1996). Development of an Instrument Ot Mesure the Perceptions of Adopting an Information Technology Innovation. *Information Systems Research, 2(3)*, 192-222. doi:10.1287/isre.2.3.192

Namkee, P., Mohja, R., Jinghui, H., & Kwan, L. (2014). Understanding the acceptance of teleconferencing systems among employees: An extension of the technology acceptance model. *Computers in Human Behavior*, 118-127. doi:http://dx.doi.org/10.1016/j.chb.2014.05.048

ISSN 2410-3977
ECORFAN® All rights reserved

Navarro, A., Cigarrán, J., Huertas, F., Rodríguez, A., & Cogolludo, A. (2014). An Integration Architecture of Virtual Campuses with External e-Learning Tools. *Journal of Educational Technology & Society*, pp.252-266. Obtenido de https://www.jstor.org/stable/jeductechsoci.17.3.252?seq=1#page_scan_tab_contents

Navarro, A., Cristóbal, J., & Fernández, C. (30 de Septiembre de 2011). Architecture of a multiplatform virtual campus. *Wiley Online Library*. doi:10.1002/spe.113

Nuñez, Tapía, D. (2016). PLATAFORMAS VIRTUALES QUE UTILIZAN EN EL SIGLO XXI LAS INSTITUCIONES DE NIVEL SUPERIOR DE ECUADOR. *Congreso Online Educación del Siglo XXI*, 331-340. Obtenido de http://www.eumed.net/libros-gratis/actas/2016/educacion/rbtn.pdf

Oprea, C. L. (14 de August de 2014). The Internet - a tool for interactive learning. *Procedia - Social and Behavioral Sciences, Volume 142*, Pages 786-792. Obtenido de https://doi.org/10.1016/j.sbspro.2014.07.617

Perez, M. O., Giampaolo, M., & Perazzi, J. (2014). Evaluación de indicadores de gestión en las universidades públicas colombianas: una aplicación de modelos de ecuaciones estructurales. *Innovaciencia facultad ciencias exactas fis. naturales, 2(1):* , 4 - 16.

Piccoli, G., & Adhmad , R. (2009). Virtual Learning Enviroments A Research Framework and a Preliminary Management Information. *System Research Center, University of Minnesota, 25*(4), 401-426. doi:10.2307/350989 Pineda López, D. (02 de 03 de 2020). Formación de docentes virtuales en estrategias didácticas mediadas por TIC para el fortalecimiento de los procesos de formación en educación virtual de la Universidad Tecnológica de Pereira (Master's thesis, Universidad de La S. Obtenido de http://hdl.handle.net/10818/39813

Pulido et al. (2013). Uso Problematico de las nuevas tecnologias en estudiantes universitarios. *Revista Electrónica de Psicología, 16*(4), 1119-1140.

Raaij, E., & Schepers, J. (2008). The acceptance and use of a virtual learning environment. *Computer Education*. doi:doi:10.1016/j.compedu.2006.09.001

Ramirez, R., Sabat, F., Audet, X., & Lordan, O. (2017). Aceptación y uso de los sistemas e-learningporestudiantes de grado de ecuador: El caso de unauniversidad estatal. *Redalyc.org*, pp.250-278. Obtenido de http://www.redalyc.org/html/549/54952487003/index.html

Rivera,, H., & Dayan , E. (2020). *Planfortic "plan de formación mediado por TIC, para incrementar la calidad en los procesos formativos de los agentes educativos y auxiliares pedagógicos vinculados a ASAPIP operador del ICBF en el municipio de planadas Tolima".* Master's thesis, Universidad de La Sabana. Obtenido de https://intellectum.unisabana.edu.co/bitstream/handle/10818/39641/Tesis%20Elisa%20Dayan%20Henao%20Rivera.pdf?sequence=1&isAllowed=y

Rogers, E. (17 de Aug de 2010). A Prospective and Retrospective Look at the Diffusion Model. *Journal of Health Communication* , pp. 13-19. doi:10.1080/10810730490271449

Rosa, C., Riaño, & Rodríguez. (15 de Febrero de 2020). Modelo de aprendizaje mixto frente al compromiso de los estudiantes de grado 11° aplicado a la enseñanza de la matemática financiera en el colegio gimnasio campestre Santa Sofía de Zipaquirá. Colombia. Obtenido de http://hdl.handle.net/20.500.12494/16981

Sáez, J. M., & Fernández, M. (2012). Discovering Edmodo: benefits of microblogging in adult education. *Campo Abierto, vol. 31*(No.2), pp. 53-69. Obtenido de https://dialnet.unirioja.es/descarga/articulo/4168072.pdf

Schoology. (26 de octubre de 2018). *www.schoology.com*. Obtenido de https://www.schoology.com/

Shu-Shen, L. (2013). Perceived satisfaction,behavioral intention, and effectiveness of e-learning:A case study of the Blackboard system. *Computers & Education, 5*, 864-873. doi:doi:10.1016/j.compedu.2007.09.005

ISSN 2410-3977
ECORFAN® All rights reserved

Solomu, K. P. (2015). Characterization of Educational Resources in E-learning system using an Educational Metadata profile. *Journal of Educational Technology & Society, 18*(4), 246-260.

Soto, F., Martinez , S., & Otero, N. (2009). Ventajas del uso de las TIC´s en el proceso de enseñanza aprendizaje desde la óptica de los docentes universitarios españoles. *Revista Electrónica de Tecnología Educativa, Vol 29*, pp 1-12.

Taylor, S., & Todd, P. (1995). Assessing IT Usage: The Role of Prior Experience. *Management Information Systems Research Center, University of Minnesota*, 561-570. doi:10.2307/249633

Venkatesh, V., Morris, M., & Davis, G. (2003). User Acceptance of Information Technology: toward a Unifed View. *MIS Quarterly, Vol. 27*, pp. 425-478. doi:DOI: 10.2307/30036540

Wallace, L., & Sheetz, S. (2014). The adoption of software measures: A technology acceptance model (TAM) perspective. *Information & Management, 51*, 249-259. doi:http://dx.doi.org/10.1016/j.im.2013.12.003

Wiley, D. (2001). Connecting Learning Objects to Instructional Design Theory: A Definition, a Metaphor, and a Taxonomy. *The Instructional Use of Learning Objects*.

Yábar et al. (2007). The UAB virtual campus essential platform for a European higher education environment. *Journal of Cases on Information Technology, 9*(2), 37-38.

Yábar, J. M., Yábar, J., Hernández, J., López , R., & Castella, J. (2007). The UAB virtual campus: An essential platform for a European higher education environment. *Journal of Cases on Information Technology, Vol.9*(No.2), pp.37-48.

Yong Varela, L., Rivas Tovar, L., & Chaparro, J. (2010). Modelo de aceptación tecnologica (TAM):Un estudio de la influencia de la cultura y del perfil del usuario en el uso de las TIC. *Journal Innovar*, pp. 187-203. Obtenido de http://www.redalyc.org/pdf/818/81819028014.pdf

Yong Varela, L., Rivas Tovar, L., & Chaparro, J. (2010). Modelo de aceptación tecnologica (TAM):Un estudio de la influencia de la cultura y del perfil del usuario en el uso de las TIC. *Journal Innovar*, 187-203. Obtenido de http://www.redalyc.org/pdf/818/81819028014.pdf

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