Je-LKS
Journal of e-Learning and Knowledge Society
The Italian e-Learning Association Journal
PEER REVIEWED PAPERS
Vol. 14, n.2, 2018
ISSN: 1826-6223 | eISSN: 1971-8829

MODEL FOR MEASURING THE IMPLEMENTATION OF ONLINE PROGRAMS IN HIGHER EDUCATION

Diana Marcela Cardona-Román [1]
Jenny Marcela Sánchez-Torres [1]
Josep M. Duart[2]

[1] Faculty of Engineering, Department of Systems and Industrial Engineering - Universidad Nacional de Colombia - Colombia
{dmcardonar; jmsanchezt}@unal.edu.co
[2] Faculty of Psychology and Educational Sciences
Universitat Oberta de Catalunya - Spain
jduart@uoc.edu

Keywords: Measurement model, e-learning implementing, expert judgment, virtual.

This study presents the results of expert judgment assessment of a model to measure the implementation of online programs in higher education. Online education is an innovative approach that has been used worldwide by several universities. The evaluation of the implementation of online education is, generally, focused in technology, content quality, instructor and service quality and learner satisfaction. However, it is weak in the structural and functional aspects of the universities. Therefore, a question needs to be answered: Are the dimensions and components of this model suitable for measuring the implementation of online programs? In order to answer that question, this work follows a descriptive statistical approach and four stages: 1. preparing the questionnaire for model assessment; 2. selecting experts; 3. application of the questionnaire; and 4. analysis of results. This study collected 39 completed responses from experts. The Aiken's V coefficient was used as a measure to quantify the expert agreement.

for citations:
Cardona-Román D.M., Sánchez-Torres J.M., Duart J.M. (2018), *Model for Measuring the Implementation of Online Programs in Higher Education,* Journal of e-Learning and Knowledge Society, v.14, n.2, 189-202. ISSN: 1826-6223, e-ISSN:1971-8829
DOI: 10.20368/1971-8829/1394

Findings illustrate the importance (88.4%), sufficiency (82%), influence (81.8%) and priority of the model components. As a conclusion, it was found that the dimensions and components of the model are suitable for measuring the implementation of online programs. The expert criterion is an important technique to support models designed from the literature. Limitations, as well as possible research directions, are also discussed.

1 Introduction

Information and communication technologies (ICT) have created new opportunities for education. According to Siritongthaworn *et al.* (2006) e-learning is an innovative approach to education access through the Internet for improving the learner knowledge and skills. ICT support online education and allow universal access to education, equality in instruction, quality of teaching and learning, and professional development of students and professors. It also enables a more efficient management of the education system (Bhuasiri *et al.*, 2012; Selem, 2007).

The implementation of online education is understood as a process of putting into practice either a decision or a plan that goes beyond the educational processes and do not just focus in the computational tools (Sharma, 2011). The Ministry of National Education of Colombia defines the implementation of online programs as all the actions that allow an academic program to be executed (MinEducación, 2007).

Assessment of online education may have different points of views according to the literature review. Some studies were student-centred, i.e. they assess learning goals, service quality, learners satisfaction, interactions, and technology use (Abbad, 2011; Bartimote-Aufflick *et al.*, 2015; Fetaji & Fetaji, 2009; Goh *et al.*, 2017; Ozkan & Koseler, 2009; Selim, 2007; Stefaniak, 2015). Other studies were focused on content, instructor quality, challenges, barriers when introducing an educational innovation, the best practices and critical success factors (Al-Azawei *et al.*, 2016; Berechet & Istrimschi, 2014; Bhuasiri *et al.*, 2012; Clegg & Bradley, 2006; Davidovitch & Belichenko, 2016; de Freitas & Oliver, 2005; McPherson & Nunes, 2006; Ozkan & Koseler, 2009; Shoham & Perry, 2009; Stansfield *et al.*, 2009). However, few studies have assessed elements such as structural configuration, regulations, organizational change and alignment of the mission and vision of an educational organization. These are key elements in higher education institutions (HEIs) for planning and teaching online education.

Moreover, there are very limited studies available to assess the e-learning implementation in a complete academic program, because most studies focus on assessing the implementation of an single online course (Goh *et al.*, 2017).

This lack of studies on assessment of e-learning implementation in a com-

plete program with organisational elements generate an opportunity to solve it. Thus, this work propose a model for measuring the implementation of online programs (MMIOP) in higher education. The MMIOP is supported by the idea that organizational change is necessary to allow and encourage innovation in education (Cabrero & Arellano, 1993). Leadership, incorporation and integration of ICT in education are also taken into account in the model, as was pointed out by trends of the Institute of Prospective Technological Studies (IPTS) and the European Commission (Ala-mutka *et al.*, 2010).

This study aims is to examine the suitability of the MMIOP taking into account the experts opinion. In this context, the research question proposed was: Are the dimensions and components of the MMIOP suitable for measuring the implementation of online programs?

The consultation conducted by experts in e-learning and organizational management topics has the purpose of answering the following guiding questions:

1. What is the importance level of the components embracing each dimension?
2. What is the influence level of the components of each dimension to the success of measuring the online programs implementation?
3. As an expert, are the components of each dimension sufficient to measure it?
4. Which is the priority order of the components of each dimension to measure them?

The next sections of this article describe the proposed model, employed methodology, results of the descriptive analysis by each guiding questions, and concluding remarks.

2 Conceptual Model

The MMIOP was done based on the analysis of articles from scientific literature and legal documentation about e-learning and organizational management in education. The first version of MMIOP was assessed in 2016 by a group of professors from a Spanish university, who are experts in distance education and e-learning issues. This university has experience teaching distance courses since 1971 and e-learning courses since 1993. The results of this assessment contributed to the refinement of the first version of MMIOP, to perform adjustments in the descriptions writing and to reduce the model components in the second version.

The MMIOP in its second version, included three dimensions and 15 components. This second version of MMIOP allows stablishing a reference framework in order to determine the progress level of the HEIs in the implementation of

its online programs. A description of each dimension is presented in Table 1.

Table 1
DEFINITION OF THE MMIOP

Dim.	Description	Component	Authors
Structural	It is related to organizational configurations that influence the actual decision-making process for offering online programs.	Organizational support	(Abbad, 2011; Al-Azawei *et al.*, 2016; AQU, 2015; Berechet & Istrimschi, 2014; Bhuasiri *et al.*, 2012; Cabrero & Arellano, 1993; Davidovitch & Belichenko, 2016; Hassanzadeh *et al.*, 2012; Hubackova, 2015; McPherson & Nunes, 2006; O'Neill, Singh, & O'Donoghue, 2004; Selim, 2007; Sharma, 2011; Siritongthaworn *et al.*, 2006; Stansfield et al., 2009)
		Training	
		Human capital	
		Organizational communication	
		Resources	
		Organizational structure	
		Organizational formalization	
Functional	It is about the utilitarian factors of the educational organization to support online education such as mission, vision, values, strategic objectives, teaching planning, organizational culture, organizational cooperation, evaluation and quality assurance.	Quality assurance and evaluation	(AQU, 2014; Clegg & Bradley, 2006; de Freitas & Oliver, 2005; Doherty, 2010; El-Ghalayini & El-Khalili, 2012; Fetaji & Fetaji, 2009; Grigoraş, Dănciulescu, & Sitnikov, 2014; Hubackova, 2015; Jung, 2011; Lomis & Rodriguez, 2009; Ozkan & Koseler, 2009; Shoham & Perry, 2009; Stansfield et al., 2009; Stefaniak, 2015)
		Organizational culture	
		Organizational strategy	
		Teaching planning	
Operational	It is about the operation, planning and development of the online program, optimizing the economic, administrative, and technological resources.	Program overview	(AQU, 2012, 2014, 2015; Bartimote-Aufflick *et al.*, 2015; Becker, Knackstedt, & Pöppelbuß, 2009; ENQA, 2015; Fetaji & Fetaji, 2009; Goh *et al.*, 2017; Presidencia de la República de Colombia & Ministerio de Educación Nacional, 2015)
		Research	
		Educational resources	
		Curriculum	

3 Methodology

In this study was applied both quantitative approach, and descriptive statistics strategy, in order to present the results of the assessment of the MMIOP by a group of experts.

3.1 Preparing the questionnaire for model assessment

In this stage, the questionnaire was designed following the four guiding questions above for the components of each dimension. The assessment criteria used in the questionnaire were: priority, importance, influence, and sufficiency (Escobar & Cuervo, 2008). Two PhDs and one master reviewed the questionnaire. This review allowed to rewrite two questions, change the answer options

of a question and add four more questions. Subsequently, the questionnaire was configured on-line, with 36 questions on the LimeSurvey web server.

3.2 Selecting experts

This stage began with a selection of experts in e-learning and organizational management topics. The identified population was found in the Network of Scientific Journals of Latin America and the Caribbean, Spain and Portugal (REDALYC). This is a bibliographic database and a digital library of open access journals that collects the publications of different experts from Latin-American and the Caribbean. The experts were selected based on their knowledge and experience in the above topics (Bhuasiri *et al.*, 2012; Escobar & Cuervo, 2008). The selected experts had publications in the last five years, with postgraduate education (PhD and master) and affiliated with universities. As result, 103 experts were identified in the field of organizational management and e-learning in Latin-American from twelve several countries: Spain (29), Colombia (27), Mexico (27), Venezuela (7), Costa Rica (3), Ecuador (3), Cuba (2), Argentina (1), Brazil (1), Chile (1), Nicaragua (1) and Uruguay (1).

3.3 Application of the questionnaire

The questionnaire was sent to the 103 selected experts. The expert requests were conducted by email through an online questionnaire. Five of the requests did not reach the recipients because the destination email servers reject them. Three of the experts wrote that they could not participate in the study, 51 experts started the questionnaire, and only 39 completed it. The data collection process was between December 2016 and January 2017. The distribution of participants in regional terms was: Colombia and Spain comprised 35.9% of participation respectively. Mexico corresponded to 20.5%. Chile, Cuba and Ecuador included 2.6% each one. The formation level of the experts was 61.5% for PhD and 38.5% for Master. 48.7% of the experts manifested more than 20 years of professional experience. Knowledge of the 67% of the experts was related to organizational management topic in “high” and “very high” categories. Around 97.4% corresponds to the knowledge of experts in online education topic in “high” and “very high” categories.

3.4 Analysis of results

This stage was performed through the analysis of the 39 complete responses of the questionnaire provided by the experts. The descriptive statistical analysis was carried out using measures of central tendency, dispersion measures, charts, Cronbach’s alpha coefficient and Aiken’s V coefficient (Escobar & Cuervo,

2008; Escurra, 1988). The software used to process the results was SPSS v20. The importance level and influence level of the dimensions were computed using the percentage values sum of "high" and "very high" categories in the components of each dimension. The Aiken's V coefficient was used to quantify the agreement or concordance among the experts with the dimensions and components of the MMIOP. Construct validity refers to the degree to which the instrument measures a particular construct done in theoretical manner. It was analysed for the structural, functional, and operational dimensions.

In order to estimate the confidence of an expert, as proposed by Escobar & Cuervo (2008), it is necessary to quantify the agreement among them, especially when the agreement includes subjective elements from each expert. The measure of agreement (V) estimates the consensus among the experts by scoring and it is defined by Eq.1. Thus, the computed value is expected to be close to 1.

$$V = \frac{S}{N(C-1)} \qquad \text{Eq. 1}$$

where:
S = Sum of value assigned by each expert
N = Number of experts (39 in this case)
C = Number of categories (5 in this case)

The Aiken's V coefficient was selected because it combines the ease of calculation of multiple experts, guarantees the objectivity of the procedure and contributes to verify the content (Escurra, 1988). The confidence intervals with 95% were calculated using the score method and the equations used by Merino & Livia (2009). These equations establish the statistical significance to understand the results and minimally acceptable values.

4 Results and discussion

4.1 Importance level assessment

Responses from experts on the importance of components in each dimension are shown in the Fig. 1. This figure shows the most important components as: curriculum of the operational dimension, teaching planning of the functional dimension and human capital of the structural dimension.

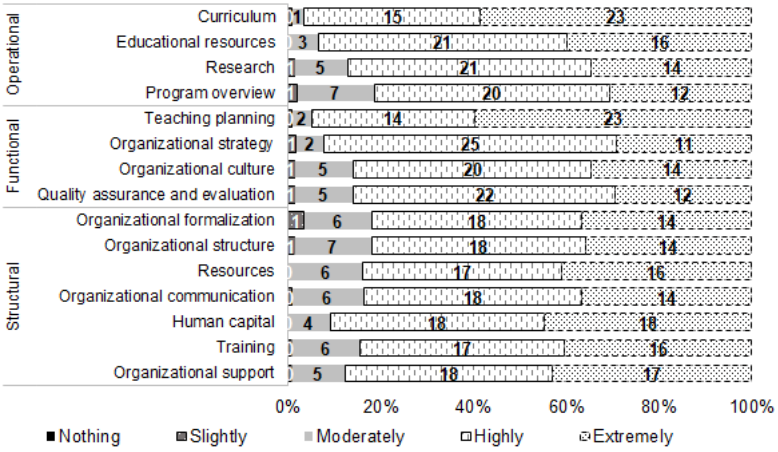

Fig. 1 - Importance of the components and dimensions of the MMIOP.

Positive answers about the importance of the components that integrate the three dimensions indicate the agreement among the experts who evaluated the model. Specifically, the fact that 90.5% of the experts considered "extremely" and "highly" important the assessment of the functional dimension suggests that it is relevant and contains utilitarian factors of the organizational management required by HEIs.

Regarding to the operational dimension, 89% of experts reveal that this dimension is "extremely" and "highly" important. This suggests a high agreement among the experts and the need to assess some planning elements of online programs.

In the case of the structural dimension, more than 85.6% of experts considered "extremely" and "highly" important the assessment of the dimension. In addition, it suggests that the structural dimension is also relevant and contains structural specifications required to measure the implementation of online programs.

The table 2 presents the calculated values: mean (μ), median ($\tilde{X}$), standard deviation (σ), Aiken's V Coefficient (V), confidence interval (sig), and Pearson Correlation Coefficient (p). The values of the median reveals that the concentration of importance level of components were between "highly" and "extremely" important. It means that all components of the three proposed dimensions were important for measuring the implementation of online programs in HEIs.

Table 2
IMPORTANCE OF COMPONENTS ACCORDING TO EXPERTS

Dim.	Component	μ	X	σ	V	Sig.	1.	2.	3.	4.
1. MMIOP		4.26	4	.64	.81	.75-.85	1	.76**	.75**	.92**
2. Structural	Organizational support	4.30	4	.65	.82	.76-.87				
	Training	4.25	4	.63	.81	.75-.85				
	Human capital	4.36	5	.61	.83	.78-.88				
	Organizational communication	4.20	4	.65	.79	.73-.84		1	.49**	.64**
	Resources	4.25	4	.65	.81	.75-.86				
	Organizational structure	4.17	4	.74	.79	.73-.84				
	Organizational formalization	4.15	4	.75	.78	.72-.84				
3. Functional	Quality assurance and evaluation	4.14	4	.59	.78	.72-.83				
	Organizational culture	4.19	4	.70	.79	.74-.85			1	.65**
	Organizational strategy	4.20	4	.57	.79	.73-.85				
	Teaching planning	4.54	5	.61	.88	.83-.92				
4. Operational	Program overview	4.10	4	.70	.77	.71-.83				
	Research	4.21	4	.69	.80	.74-.85				1
	Educational resources	4.33	4	.59	.83	.77-.88				
	Curriculum	4.56	5	.54	.89	.84-.93				

Aiken's V analysis shows that all components have high degree of agreement among experts (V>0.7) and only eight components have a strong agreement (V>0.8) (Escurra, 1988). Besides, the values of each Aiken's V coefficient are within the confidence intervals (sig), therefore, all components of the model were accepted (Merino & Livia, 2009).

The Pearson Correlation Coefficient was computed to examine strength among dimensions and to know the construct validity of dimensions and MMIOP. Correlation analysis shows that all dimensions were both significant and positively correlated ($p<0.01$). In particular, the operational dimension was the most highly correlated with the model, because it comprised a correlation of 0.92, followed by the structural dimension that achieved 0.76, and the functional dimension with 0.75. Those values confirm that the conceptual construction of the MMIOP was relevant and consistent.

The MMIOP obtained a Cronbach's Alpha Coefficient (α) of 0.88, the structural dimension achieved 0.82, the functional dimension obtained 0.71, and the operational dimension reached 0.8. These α values corroborate the internal consistency, reliability, and construct validity for both each dimension and the whole model (Hassanzadeh *et al.*, 2012; Ozkan & Koseler, 2009).

4.2 Influence level assessment

Five categories were proposed to assess the influence level of the components of the MMIOP (very low-very high). The results allowed to establish which components were the most influential in measuring the implementation of online programs, according to expert judgments (see Fig. 2). The most significant components of each dimension were: quality assurance and evaluation of the functional dimension with 94.9% of influence; human capital of the structural dimension with 92.3% of influence; and curriculum of the operational dimension obtained 89.7% of influence. The components with the lowest agreement of experts in the influence level were: program overview with 61.5% of influence and organizational formalization with an influence of 69.2%.

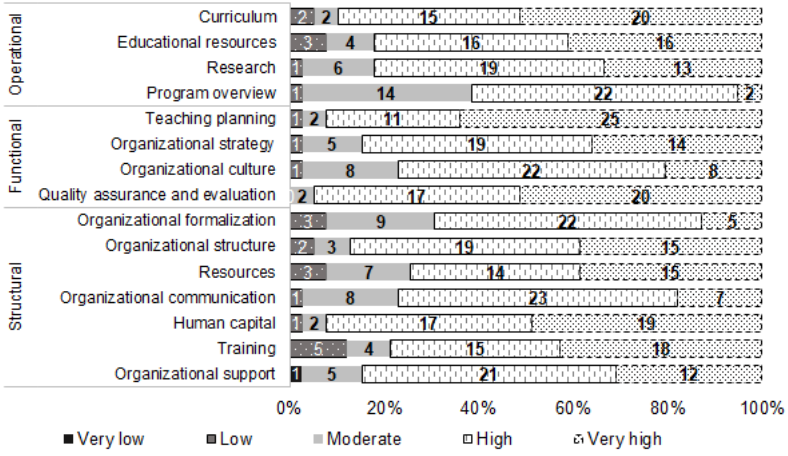

Fig. 2 - Influence of components and dimensions on the success of MMIOP measurement.

The structural dimension obtained an influence of 80.4% and Aiken's V of 0.77; the functional dimension achieved 87.2% of influence and an agreement of 0.82 in Aiken's V. The operational dimension obtained 78.8% of influence and Aiken's V of 0.76. Finally, taking into account the "very high" and "high" values of the categories to assess the influence, the experts responses reveals an influence of 81.8% of all components that ensures the success of the model measurement. Those values represent an estimator to establish that the proposed model was suitable and its components and dimensions influence the measurement of MMIOP.

4.3 Sufficiency assessment

The sufficiency of the components was assessed through five categories (very insufficient, insufficient, moderate, sufficient and very sufficient). The components for measuring the dimensions were "very sufficient" and "sufficient" according to 82% of the experts. None dimension was assessed as insufficient. The operational dimension achieved 87.2% of sufficiency, followed by the functional dimension with 84.6%, and the structural dimension obtained 74.4% of sufficiency.

4.4 Priority order assessment

The MMIOP was initially configured in alphabetical order, but it was necessary to know how each component in each dimension should be ordered. For this reason, experts were asked to prioritize each component in each dimension.

The score was computed to establish the ranking of the components in each dimension. The results of this calculation are shown in Fig. 3 for the three dimension of MMIOP. This figure also shows the ordered dimensions and components according to the priority set by the experts.

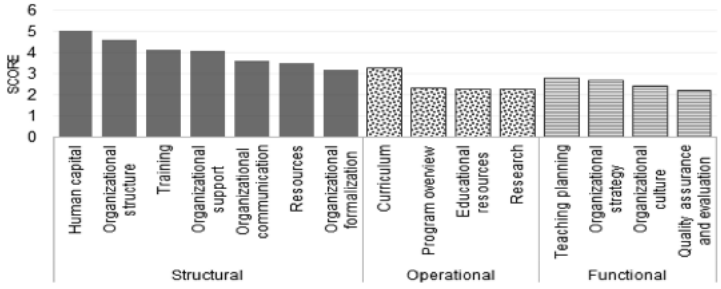

Fig. 3 - Priority of the measurement of the components of each dimension of the MMIOP.

The results contribute to fit the model according to the order established by the experts. The ranking of components of the structural dimension was: 1. Human capital, 2. Organizational structure, 3. Training, 4. Organizational support, 5. Organizational communication, 6. Resources, and 7. Organizational formalization. The ranking of components of the operational dimension was: 1. Curriculum, 2. Program overview, 3. Educational resources, and 4. Research. Finally, the ranking of the functional dimension was: 1. Teaching planning, 2. Organizational strategy, 3. Organizational Culture, and 4. Quality assurance

and evaluation.

The answers obtained for the four guiding questions provided a framework for deciding about the components changes and model fit. A synthesis of the results was the high importance, the high influence and the sufficiency of the components of each dimension for measuring the execution of the online programs. Finally, the priority of the measurement is an interesting aspect to assess because it offers a manner to order the MMIOP and configures the evaluation's instrument to apply in the HEIs.

Conclusions

The assessment by expert judgment is a useful technique when is required provide stability to a conceptual model of measurement. The assessment outcomes of the MMIOP confirm that this is suitable, its content is valid, and it is accepted by the consulted experts. In consequence, the research question of this paper was answered.

The experts characterization allowed identify that the selected professionals have a long career and a high-level knowledge in the field of e-learning and organizational management. The inclusion criteria ensure that the experts were qualified to comment and verify the MMIOP. The consensus among the experts was confirmed in the importance, influence, sufficiency, and priority of the components of each dimension.

The construct validity of the model dimensions was corroborated with the analysis of the judgments issued by international experts and the statistically significant correlations obtained it. Thus, the results confirm that the model elaborated from literature review was suitable, covers several aspects, and contribute to establish a mechanism for measuring the implementation of online education in the HEI.

Despite the relevant findings in the implementation of online programs in the HEIs this study has some limitations. The research focused exclusively with experts from Spanish-speaking countries, leaving out the experiences of experts from English-speaking countries with significant advances in e-learning. The experts have different needs, motivations, and constraints for using and evaluating the e-learning systems that could affect the qualifications of the MMIOP. Future research should consider the application of additional questionnaires in the HEIs of the Colombian context, in order to obtain a better representation of the reality and it also assurance the success of the model.

REFERENCES

Abbad, M. (2011). A Conceptual Model of Factors Affecting eLearning Adoption. *Engineering Education*, *2*(1989), 1108–1119.

Al-Azawei, A., Parslow, P., & Lundqvist, K. (2016). Barriers and Opportunities of E-Learning Implementation in Iraq: A Case of Public Universities. *International Review of Research in Open and Distributed Learning*, *17*(5), 126–146.

Ala-mutka, K., Redecker, C., Punie, Y., Ferrari, A., Cachia, R., & Centeno, C. (2010). *The Future of Learning : European Teachers ' Visions. JRC59775 - 2010. IPTS Institute for prospective Technological Studies and JRC European Commission*. Seville.

AQU. (2012). *Guía para la Elaboración y Verificación de las Propuestas de Titulaciones Universitarias de Grado y Máster*. (G. de Catalunya, EQAR, ENQA, & I. 9001, Eds.) (3rd ed., Vol. 3). Barcelona, Spain.

AQU. (2014). *Guía de Seguimiento de Títulos Oficiales de Grado y Máster*. (G. de Catalunya, EQAR, ENQA, & I. 9001, Eds.) (3rd ed.). Barcelona, Spain.

AQU. (2015). *Guía para la certificación de la implantación de sistemas de garantía interna de la calidad*. (G. de Catalunya, EQAR, ENQA, I. 9001, & I. 27001, Eds.) (2da). Barcelona, Spain.

Bartimote-Aufflick, K., Bridgeman, A., Walker, R., Sharma, M., & Smith, L. (2015). The study, evaluation, and improvement of university student self-efficacy. *Studies in Higher Education*, (3), 37–41. http://doi.org/10.1080/03075079.2014.999319

Becker, J., Knackstedt, R., & Pöppelbuß, J. (2009). Developing Maturity Models for IT Management. *Business & Information Systems Engineering*, *1*, 213–222. http://doi.org/10.1007/s12599-009-0044-5

Berechet, L. D., & Istrimschi, P. A. (2014). Education Reboot: Reinventing the University. *Procedia - Social and Behavioral Sciences*, *142*, 755–761. http://doi.org/10.1016/j.sbspro.2014.07.611

Bhuasiri, W., Xaymoungkhoun, O., Zo, H., Rho, J. J., & Ciganek, A. P. (2012). Critical success factors for e-learning in developing countries: A comparative analysis between ICT experts and faculty. *Computers & Education*, *58*(2), 843–855. http://doi.org/10.1016/j.compedu.2011.10.010

Cabrero, E., & Arellano, D. (1993). Análisis de innovaciones exitosas en organizaciones públicas. Una propuesta metodológica. *Gestión Y Política Pública*, *II*(1), 59–86.

Clegg, S., & Bradley, S. (2006). Models of personal development planning: practice and processes. *British Educational Research Journal*, *32*(1), 57–76. http://doi.org/10.1080/01411920500402003

Davidovitch, N., & Belichenko, M. (2016). Developmental and Implementation Challenges of E-Learning Management Systems in Higher Education. *Higher Education Studies*, *6*(4), 170. http://doi.org/10.5539/hes.v6n4p170

de Freitas, S., & Oliver, M. (2005). Does E-learning Policy Drive Change in Higher Education?: A case study relating models of organisational change to e-learning

implementation. *Journal of Higher Education Policy and Management*, *27*(1), 81–96. http://doi.org/10.1080/13600800500046255

Doherty, I. (2010). Agile Project Management for e-Learning Developments. *Journal of Distance Education*, *24*(1), 91–106.

El-Ghalayini, H., & El-Khalili, N. (2012). An approach to designing and evaluating blended courses. *Education and Information Technologies*, *17*(1), 417–430. http://doi.org/10.1007/s10639-011-9167-7

ENQA. (2015). Standards and guidelines for quality assurance in the European higher education area, (5), 23.

Escobar, J., & Cuervo, Á. (2008). Validez de contenido y juicio de expertos: Una aproximación a su utilización. *Avances En Medición*, *6*, 27–36.

Escurra, L. M. (1988). Cuantificación de la validez de contenido por criterio de jueces. *Revista de Psicología*, *6*(1–2), 103–111.

Fetaji, B., & Fetaji, M. (2009). e-Learning Indicators: a Multi-Dimensional Model for Planning and Evaluating e-Learning Software Solutions. *Electronic Journal of E-Learning*, *7*(2), 1–28.

Goh, C. F., Leong, C. M., Kasmin, K., Hii, P. K., & Tan, O. (2017). Students' Experiences, Learning Outcomes and Satisfaction in e-Learning. *Journal of E-Learning and Knowledge Society*, *13*(2), 117–128. http://doi.org/10.20368/1971-8829/1298

Grigoraş, G., Dănciulescu, D., & Sitnikov, C. (2014). Assessment Criteria of E-learning Environments Quality. *Procedia Economics and Finance*, *16*(May), 40–46. http://doi.org/10.1016/S2212-5671(14)00772-2

Hassanzadeh, A., Kanaani, F., & Elahi, S. (2012). A model for measuring e-learning systems success in universities. *Expert Systems with Applications*, *39*(2), 10959–10966.

Hubackova, S. (2015). Evolution and Evaluation of e-learning. *Procedia - Social and Behavioral Sciences*, *171*, 231–235. http://doi.org/10.1016/j.sbspro.2015.01.114

Jung, I. (2011). The dimensions of e-learning quality: from the learner's perspective. *Educational Technology Research and Development*, *59*(4), 445–464. http://doi.org/10.1007/sl 1423-010-917

Loomis, S., & Rodriguez, J. (2009). Institutional change and higher education. *Higher Education*, *58*(2), 475–489. http://doi.org/10.1007/s10734-009-9206-0

McPherson, M., & Nunes, M. B. (2006). Organisational issues for e-learning: Critical success factors as identified by HE practitioners. *International Journal of Educational Management*, *20*, 542–558. http://doi.org/10.1108/09513540610704645

Merino, C., & Livia, J. (2009). Intervalos de confianza asimétricos para el índice la validez de contenido: Un programa Visual Basic para la V de Aiken. *Anales de Psicologia*, *25*(1), 169–171. http://doi.org/10.6018/71631

MinEducación, M. de E. N. (2007). *Propuesta de metodología para transformar programas presenciales a virtuales o e-learning*. (C. Consorcio Elearning 2.0 & MEN, Eds.) (Primera). Bogotá D.C., Colombia.

O'Neill, K., Singh, G., & O'Donoghue, J. (2004). Implementing eLearning Programmes

for Higher Education: A Review of the Literature. *Journal of Information Technology Education*, *3*(1), 313–323.

Ozkan, S., & Koseler, R. (2009). Multi-dimensional students' evaluation of e-learning systems in the higher education context: An empirical investigation. *Computers & Education*, *53*(4), 1285–1296. http://doi.org/10.1016/j.compedu.2009.06.011

Presidencia de la República de Colombia, & Ministerio de Educación Nacional. (2015). Decreto No. 1075 del 26/05/2015: que expide el Decreto Único Reglamentario del Sector Educación. Bogotá D.C., Colombia.

Selim, H. M. (2007). Critical success factors for e-learning acceptance: Confirmatory factor models. *Computers & Education*, *49*(2), 396–413.

Sharma, K. (2011). Financial implications of implementing an e-learning project. *Journal of European Industrial Training*, *35*(7), 658–686. http://doi.org/10.1108/03090591111160788

Shoham, S., & Perry, M. (2009). Knowledge management as a mechanism for technological and organizational change management in Israeli universities. *Higher Education*, *57*(2), 227–246. http://doi.org/10.1007/s10734-008-9148-y

Siritongthaworn, S., Krairit, D., Dimmitt, N. J., & Paul, H. (2006). The study of e-learning technology implementation: A preliminary investigation of universities in Thailand. *Education and Information Technologies*, *11*, 137–160. http://doi.org/10.1007/s11134-006-7363-8

Stansfield, M., Connolly, T., Cartelli, A., Jimoyiannis, A., Magalhaes, H., & Maillet, K. (2009). The Identification of Key Issues in the Development of Sustainable e-Learning and Virtual Campus Initiatives. *Electronic Journal of E-Learning*, *7*(2), 155–164.

Stefaniak, J. E. (2015). The implementation of service-learning in graduate instructional design coursework. *Journal of Computing in Higher Education*, *27*(1), 2–9. http://doi.org/10.1007/s12528-015-9092-7