Analysis of Gamification in b-Learning in University Higher Education: A Systematic Review of the Literature

Henry López Núñez
Universidad Técnica de Ambato

Cesar Guevara
Universidad Tecnológica Indoamérica
MIST Mechatronics and Interactive Systems Research Center

Viviana Bassante Núñez
Instituto Superior Tecnológico Bolívar

Diego Viera Pérez
Instituto Superior Tecnológico Bolívar

The evolution of university higher education has led to the incorporation of innovative learning modalities such as "blended learning", a combination of face-to-face and online teaching. An emerging element in this context is gamification, which applies elements of game design in education to improve student motivation and performance. This research analyzes the effectiveness of gamification in b-learning in university higher education and the contexts of application in the literature. A qualitative methodology was used, including descriptive and conceptual analyses based on the critical interpretation of literature documents, following the guidelines of the PRISMA statement. The findings show that gamification can increase student participation, engagement, and interest in learning. Elements of game design, such as narrative, feedback, competition, and reward, were identified that can be applied in education. In summary, the systematic review demonstrates that gamification can be an effective strategy for improving student motivation and performance in b-learning in university higher education. However, it is important to carefully design gamification to avoid negative effects.

Keywords: blended learning, education, teaching-learning, technology, students

INTRODUCTION

In the current landscape of education, there is a clear trend of improving efficiency through the adoption of information and communication technologies (ICT). Teachers are looking for the ways to modernize teaching processes, to meet the changing needs of students, new teaching methods such as e-learning and b-learning have emerged as important innovations (Núñez et al., 2019; Gonzáles et al., 2017; Bonilla et al., 2022).

Despite its effectiveness and the high satisfaction rates it receives, b-learning also exhibits several challenges, among these are the need for greater learner support, availability of sufficient resources, and time management (Fernandez et al., 2016; Müller and Mildenberger, 2021). In addition, a clear and accurate definition of what blended learning entails is still lacking, which may hinder its implementation and analysis (Gisbert et al., 2017; Nayar and Koul, 2020). However, despite these difficulties, blended learning has proven to have a significantly positive impact on the education system. It has been successful in increasing accessibility and reach for learners, reducing unnecessary costs, and improving learning outcomes (Garrison and Kanuka, 2004; Bartolomé et al., 2017; Lovos and Aballay, 2021).

Despite all of this, the implementation of b-learning requires a significant investment in terms of time and economic resources, students and teachers need continuous training to use these tools in their teaching-learning activities (Gisbert et al., 2017; Medina, 2018). However, the effort and investment can be worthwhile, as the use of these tools can lead to the creation of b-learning models based on students' competencies and skills, resulting in more effective and successful learning (Fernandes et al., 2016; Rianto, 2020; Bonilla et al., 2023).

METHODOLOGY

Systematic Reviews (SR) are critical in scientific research, analyzing and synthesizing the accumulated evidence in a specific field, guiding future research and answering complex questions that a single study could not address (Reinoso et al., 2020; Quintián, 2020). For author Moher et al. (2009), "the use of a systematic review protocol and adherence to clear submission guidelines, such as PRISMA, can improve the quality and impact of systematic reviews" (p.7). Thus, it will not only facilitate users' understanding of the area of study but will also allow other researchers to duplicate the review, promoting transparency and rigor in scientific research (González et al., 2017; Yepes et al., 2021).

This study was conducted using a systematic review method of the scientific literature, focusing on the issues of gamification in b-learning in university higher education. The documents used for this study were obtained from three databases recognized in the scientific community: Scopus, Scielo, and Redalyc. The choice of these databases allowed access to a wide range of academic and scientific publications, ensuring an extensive and representative view about the topics to be researched.

The development of this systematic review was carried out following the guidelines established by the PRISMA statement, an internationally recognized norm that establishes the standards for the performance of quality systematic reviews, before the execution of the detailed review of the documents in the mentioned databases, it was necessary to define the inclusion and exclusion criteria. These criteria allow the review to focus on the most important studies, while eliminating those that do not directly contribute to the research objectives. In the following sections, more details will be provided on the different phases of the development of this systematic review.

The PRISMA guide was followed to perform this systematic review, establishing international standards. Before the detailed review, the inclusion and exclusion criteria were defined to focus on relevant studies.

In the following sections, more details on the phases of this review will be provided.

Inclusion Criteria
- Scientific publications in Spanish and English.
- Studies published in the last 6 years.
- Studies analyzing b-learning.

Exclusion Criteria
- Articles published before 2017.
- Articles using learning techniques other than gamification.
- Articles analyzing training models other than b-learning.

- Studies that address two or more types of learning techniques in the subject.

First of all, the first database search was Scopus, the search strategy was optimized in the database, which consisted of: gamification AND blended learning AND higher education.

Secondly, the scientific search was carried out through Scielo, where the search strategy was gamification AND *b-learning AND higher education.

Third, the scientific search using Redalyc, for which the following analysis filter is used: "gamification" AND "b-learning" AND "higher education", adding that only publications from the last 5 years (2017-2023) will be considered.

Table 1 shows the methodology applied in the search for references for this study.

TABLE 1
SUMMARY AND DEVELOPMENT OF THE PRISMA METHODOLOGY

Section	Item
Eligibility criteria	Inclusion and exclusion criteria
Information sources	Scopus, Scielo, Redalyc
Search strings	(gamification) AND (b-learning) AND (higher education)
Selection process	Abstract review. The most important information and data will be chosen after a thorough review of the articles.
Data collection process	An Excel matrix was used to classify the data from the scientific databases used in the research.
Synthesis methods	The results obtained from the research and systematic review are presented in tables for a better understanding.

RESULTS

The purpose of this research was to analyze the effectiveness of b-learning in university higher education, identify challenges and difficulties in its implementation, and its pedagogical relevance in new fields of educational research. The results and search strings are shown in Table 2.
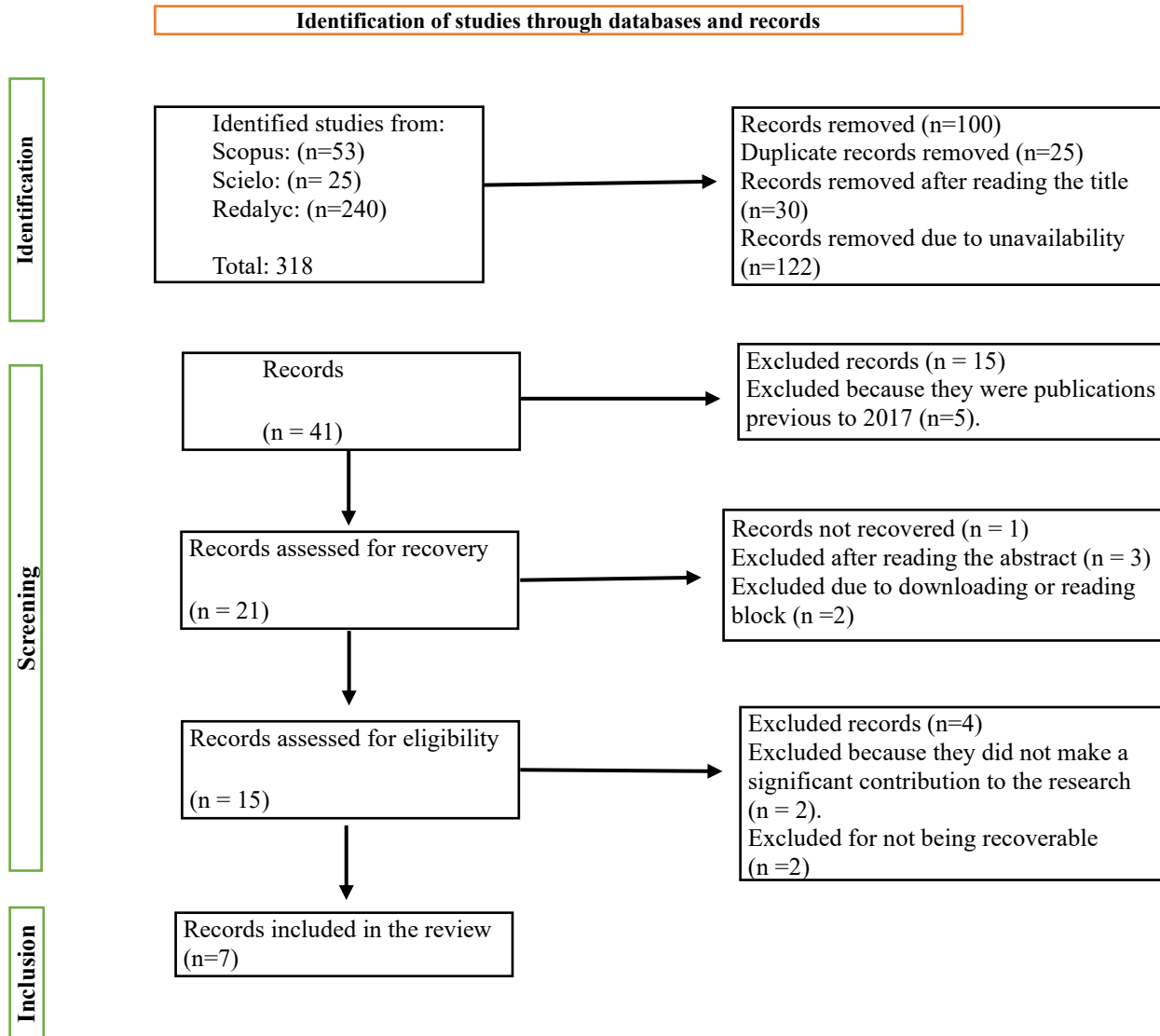
TABLE 2
RESULTS BY SEARCH ENGINE AND SEARCH STRING

Search engine	Search string	Result
Scopus	(gamification) AND (b-learning) AND (higher education)	53
Scielo	(gamification) AND (b-learning) AND (higher education)	25
Redalyc	(gamification) AND (b-learning) AND (higher education)	240
		Total 318

Source: Developed by the author

Table 2 contains a description of the different results by search engine and value chain, which was followed for the selection of the scientific articles to be used in the systematic review. The selection of each of them was made based on PRISMA standards, screening the different articles according to whether or not they met the criteria established in the study.

The information resulting from the different studies is summarized in Figure 1:

FIGURE 1
FLOW CHART (PRISMA)

| Identification of studies through databases and records |

Identification

Identified studies from:
Scopus: (n=53)
Scielo: (n= 25)
Redalyc: (n=240)

Total: 318

Records removed (n=100)
Duplicate records removed (n=25)
Records removed after reading the title (n=30)
Records removed due to unavailability (n=122)

Screening

Records

(n = 41)

Excluded records (n = 15)
Excluded because they were publications previous to 2017 (n=5).

Records assessed for recovery

(n = 21)

Records not recovered (n = 1)
Excluded after reading the abstract (n = 3)
Excluded due to downloading or reading block (n =2)

Records assessed for eligibility

(n = 15)

Excluded records (n=4)
Excluded because they did not make a significant contribution to the research (n = 2).
Excluded for not being recoverable (n =2)

Inclusion

Records included in the review
(n=7)

Source: Developed by the author

The 7 articles described in this systematic review show different studies published in countries such as Brazil, Ecuador, Chile, Peru and Mexico, obtained from the Scopus, Scielo and Redalyc databases.
The information resulting from the different studies is summarized in Table 3:

TABLE 3
CHARACTERISTICS AND RESULTS OF THE MAIN STUDIES

Authors	Methodology	Results	Conclusions
(Martín García et al., 2019)	Quantitative and qualitative methods guide the construction and development of the empirical study.	The study was able to verify that university teachers perceive b-learning teaching positively in the sense that it will help them to achieve good teaching and learning results.	B-learning is a tool that teachers are gradually including in their study methodology, in order to make digital teaching effective.
(Núñez Barriopedro et al., 2019)	The teaching-learning process has caused the research topic to be approached under different approaches and perspectives. On the one hand, the qualitative approach and, on the other hand, the quantitative approach.	According to the literature review, higher education must be adequate to the requirements of society, employment and the integral development of the individual.	After analyzing the publication, it is understood that b-learning education must be adequately adapted to society and the individuals involved in order to improve its application.
(Costa et. al, 2020)	This study examines the qualitative findings of a broader investigation in three Chilean universities. Qualitative and quantitative information was collected using the instruments of the European Hy-Suplos project, adapted and validated for the national context.	The analyzed experiences confirm the need to advance from research in the construction of a specific student profile for working with the incorporation of ICT in the classroom.	They were able to analyze the qualitative methodology, and ratified in pointing out that the research and construction of a student profile if adapted to b-learning could improve the learning.
(Dasso, 2020)	This descriptive study analyzes the results of two courses in classroom and blended learning modalities. The teacher variable was controlled and a purposive sample of students from the Technological University of Peru was used.	This study proved that the implementation of b-learning reduces the impact of student transition from face-to-face to virtual education, contributing to knowledge in this aspect.	Although b-learning is implemented for virtual education and its impact on students, it is still necessary to know more about it in order to apply it correctly in the educational area.

Authors	Methodology	Results	Conclusions
(Palomé, 2020)	This study used a quasi-experimental design and quantitative approach to investigate the impact of b-learning on competencies and learning styles of nursing students.	The lines of research focused on BL, which highlight the relevance of this design for the teaching of certain subjects and the development of key competencies, have become evident.	The correct application of B-learning in academic affairs represents a new way of designing and adopting educational measures that contribute to the concept of the new idea of study.
(Reinoso et al., 2020)	A descriptive non-experimental study was carried out to analyze the effectiveness of the model together with the general perception, degree of acceptance and satisfaction.	The incorporation of blended learning or b-learning aims to integrate new pedagogical practices within virtual learning environments.	Although this educational method is new, and must be implemented gradually, this virtual practice can be perceived as a better tool.
(Semanate-Quiñonez et al., 2021)	The method has a descriptive analysis approach because it allows to determine an analysis and its synthesis, it also evaluates the literature on developments and trends related to B-learning.	This study concludes that, although there have been advances in research on b-learning and its effectiveness in collaborative learning in the last decade, there is still no clear trend for its proper implementation.	Although there are advances in b-learning research, its use is still undefined and it is considered different from the conventional method, which generates doubts about its effectiveness.

Note. Results of the literature search using the PRISMA 2022 Methodology

Research trends in technology and blended learning in higher education show that, although technology initiatives are not yet reaching their full potential, their adoption in academic institutions has enabled progress toward the next generation of learning systems (Romero and Quintero, 2018; Costa et al., 2019). Simultaneously, digital resources such as online textbooks and popular science articles have improved teaching-learning processes, despite the failure of e-learning that resulted in high dropout rates due to personal and occupational factors (Anthony et al., 2022; Serrano, 2019).

DISCUSSION

Although the b-learning method already exists in Higher Education Institutions, more training is required for students and teachers to use it correctly. The purpose of the study was to analyze the b-learning method in different training units and to determine its effectiveness. Thus, the authors García et al. (2019) emphasize that, quantitative and qualitative methods guide the construction and development of the empirical study, they mention that university teachers perceive b-learning teaching positively in terms of achieving good teaching-learning results. However, they recognize that its implementation entails difficulties and threats.

Costa et al. (2020) examined the implementation of b-learning in Chilean universities through qualitative analysis of interviews with institutional managers. They conclude that a specific student profile for the use of ICT in the classroom should be researched and developed. On the other hand, Semanate et al.

(2021) conducted a descriptive non-experimental study on the effectiveness of b-learning. They highlight the perception, acceptance, and satisfaction of the participants, and point out that b-learning integrates pedagogical practices in virtual learning environments (Bonilla et al., 2019).

The authors Reinoso et al. (2020) conducted a descriptive non-experimental study to analyze the effectiveness of the b-learning model. Its objective was to evaluate the perception, acceptance, and satisfaction of the participants with the incorporation of b-learning in virtual learning environments. They consider this virtual practice to be a good tool, but it should be implemented gradually. On the other hand, authors Núñez et al. (2019) approach research on b-learning education from qualitative and quantitative approaches.

CONCLUSIONS

B-learning, or blended learning, combines elements of face-to-face and online learning and is an effective solution to traditional education challenges. It allows students to access online resources, perform interactive activities and participate in online discussions, fostering collaboration and active learning. It also allows face-to-face interactions with teachers and peers in face-to-face sessions.

This hybrid approach offers flexibility and personalization in learning. Students can work at their own speed, access online resources and learn at a distance without geographical restrictions. B-learning also benefits teachers, allowing them to enrich their teaching with technological tools, track student progress and foster collaboration between teachers.

There is a gap in the scientific literature on education research, especially on the effective implementation of innovative educational tools and the evaluation of their benefits and challenges. Future research could evaluate the effectiveness of gamification and b-learning in different contexts and student populations, as well as identify best practices for training teachers and overcoming barriers to implementation. It would also be beneficial to investigate the long-term impact of these approaches on learning outcomes and student satisfaction.

ACKNOWLEDGEMENT

REFERENCES

Ángel Osorio, J., & Castiblanco, S.L. (2019). Efectividad del b-learning sobre rendimiento académico y retención en estudiantes en educación a distancia. *Entramado*, *15*(1), 212–223. https://doi.org/10.18041/1900-3803/entramado.1.5406

Anthony, B., Kamaludin, A., Romli, A., Raffei, A.F.M., Phon, D.N.A.L.E., Abdullah, A., & Ming, G.L. (2022). Blended Learning Adoption and Implementation in Higher Education: A Theoretical and Systematic Review. In *Technology, Knowledge and Learning* (Vol. 27, Issue 2). Netherlands: Springer. https://doi.org/10.1007/s10758-020-09477-z

Bartolomé, A., García-Ruiz, R., & Aguaded, I. (2017). Blended learning: Panorama y perspectivas. *RIED Revista Iberoamericana de Educación a Distancia*, *21*(1), 33. https://doi.org/10.5944/ried.21.1.18842

Bonilla Jurado, D.M., Ocampo León, C.S., Camacho Escobar, M.A., & Pinos Morales, G.J. (2019). Estudio legal y estrategias sobre vinculación universitaria con la colectividad. *Caso Ecuador. Killkana Sociales: Revista de Investigación Científica*, *3*(2), 57–64. https://doi.org/10.26871/killkana_social.v3i2.465

Bonilla, D., Chávez, Z., Yambay, E., Ortega, J., & Colcha, R. (2022, July 4). Las tecnologías de la información en los sistemas contables para la gestión empresarial. *Magazine de Las Ciencias: Revista de Investigación e Innovación*, *7*(4), 51–74. https://doi.org/10.33262/rmc.v7i4.2697

Bonilla-Jurado, D., Zambrano, R., & Moncayo, H. (2023). Desarrollo profesional continuo de docentes en los Institutos Superiores Técnicos y Tecnológicos: Una revisión bibliográfica. *Revista Científica UISRAEL*, *10*(1), 27–39. https://doi.org/10.35290/rcui.v10n1.2023.647

Bonk, C.J., & Graham, C.R. (2012). *The Handbook of Blended Learning: Global Perspectives, Local Designs*. John Wiley & Sons. Retrieved from https://books.google.com.ec/books?hl=es&lr=&id=2u2TxK06PwUC&oi=fnd&pg=PA17&dq=The+Handbook+of+Blended+Learning:+Global+Perspectives,+Local+Designs.+John+Wiley+%26+Sons&ots=a2G_za5H9e&sig=oqEwws3MrW1CQt4WEsqaE4YAi2E#v=onepage&q=The%20Handbook%20of%20Blended%20Learning%3A%20Global%20Perspectives%2C%20Local%20Designs.%20John%20Wiley%20%26%20Sons&f=false

Bruggeman, B., Tondeur, J., Struyven, K., Pynoo, B., Garone, A., & Vanslambrouck, S. (2021). Experts speaking: Crucial teacher attributes for implementing blended learning in higher education. *Internet and Higher Education*, *48*, 100772. https://doi.org/10.1016/j.iheduc.2020.100772

Cabero-Alemanra, J., & Marín Díaz, V. (2017). Blended learning y realidad aumentada: Experiencias de diseño docente. *RIED. Revista Iberoamericana de Educación a Distancia*, *21*(1), 57. https://doi.org/10.5944/ried.21.1.18719

Castro, R. (2019). Blended learning in higher education: Trends and capabilities. *Education and Information Technologies*, *24*(4), 2523–2546. https://doi.org/10.1007/s10639-019-09886-3

Costa, P., Celis, K., Castillo-Valenzuela, N., & Espinoza, G. (2019). Análisis de la implementación institucional de la modalidad b-learning en carreras de pregrado de tres universidades chilenas. *Calidad En La Educación*, *50*, 216. https://doi.org/10.31619/caledu.n50.722

Dasso Vassallo, A., & Evaristo Chiyong, I. (2020). Análisis de resultados del aprendizaje presencial y aprendizaje semipresencial en dos cursos universitarios. *Educación*, *29*(57), 27–42. https://dx.doi.org/10.18800/educacion.202002.002

Fernandes, J., Costa, R., & Peres, P. (2016). Putting order into our universe: The concept of blended learning—A methodology within the concept-based terminology framework†. *Education Sciences*, *6*(2). https://doi.org/10.3390/educsci6020015

Galvis, Á.H. (2018). Supporting decision-making processes on blended learning in higher education: Literature and good practices review. *International Journal of Educational Technology in Higher Education*, *15*(1), 1–38. https://doi.org/10.1186/s41239-018-0106-1

García-Ruiz, R., Aguaded, I., & Bartolomé-Pina, A. (2017). La revolución del blended learning en la educación a distancia. *RIED. Revista Iberoamericana de Educación a Distancia*, *21*(1), 25. https://doi.org/10.5944/ried.21.1.19803

Garrison, D.R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *Internet and Higher Education*, *7*(2), 95–105. https://doi.org/10.1016/j.iheduc.2004.02.001

Gisbert Cervera, M., De Benito Crosetti, B., Pérez Garcies, A., & Salinas Ibáñez., J. (2017). Blended learning, más allá de la clase presencial. *RIED. Revista Iberoamericana de Educación a Distancia*, *21*(1), 195. https://doi.org/10.5944/ried.21.1.18859

Gómez Reyes, L. (2017). B-Learning: Ventajas y desventajas en la educación superior. *Eduq@2017 VII Congreso Virtual Iberoamericano de Calidad En Educación Virtual y a Distancia*, p.10. Retrieved from http://www.eduqa.net/eduqa2017/images/ponencias/eje3/3_47_Gomez_Leydy__BLEARNING__VENTAJAS_Y_DESVENTAJAS_EN_LA_EDUCACION_SUPERIOR.pdf

González Aldana, M.A., Perdomo Osorio, K.V., & Pascuas Rengifo, Y. (2017). Aplicación de las TIC en modelos educativos blended learning: Una revisión sistemática de literatura. *Sophia*, *13*(1), 144–154. https://doi.org/10.18634/sophiaj.13v.1i.364

Graham, C.R. (2019). Blended learning systems. In M.J. Spector, B.B. Lockee, & M.D. Childress (Eds.), *Learning, Design, and Technology: An International Compendium of Theory, Research, Practice, and Policy* (pp. 1–14). Springer. https://doi.org/10.1080/15391523.2019.1586601

Kireev, B., Zhundibayeva, A., & Aktanova, A. (2019). *Distance Learning at Higher Education Institutions: Results of an Experiment*, *10*(3), 387–403. DOI: 10.1093/jeea/jvaa060

Lovos, E., & Aballay, L. (2021). Deserción Académica y Emociones en Ambientes E-learning. *Revista Iberoamericana de Tecnología En Educación y Educación En Tecnología*, *27*, e10. https://doi.org/10.24215/18509959.27.e10

Martín García, A.V., Sánchez Gómez, M.C., & Costa, A.P. (2019). Perception of blended learning by university teachers of different disciplinary areas. *Revista Lusofona de Educacao*, *44*(44), 117–133. https://doi.org/10.24140/issn.1645-7250.rle44.07

Medina, L.C. (2018). Blended learning: Deficits and prospects in higher education. *Australasian Journal of Educational Technology*, *34*(1), 42–56. https://doi.org/10.14742/ajet.3100

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLOS Medicine*, *6*(7), e1000097. https://doi.org/10.1136/bmj.b2535

Müller, C., & Mildenberger, T. (2021, April). Facilitating flexible learning by replacing classroom time with an online learning environment: A systematic review of blended learning in higher education. *Educational Research Review*, *34*, 100394. https://doi.org/10.1016/j.edurev.2021.100394

Nayar, B., & Koul, S. (2020). Blended learning in higher education: A transition to experiential classrooms. *International Journal of Educational Management*, *34*(9), 1357–1374. https://doi.org/10.1108/IJEM-08-2019-0295

Núñez Barriopedro, E., Miguelina Monclúz, I., & Ravina-Ripoll, R. (2019). El impacto de la utilización de la modalidad B-Learning en la educación superior. *Alteridad*, *14*(1), 26–39. Retrieved from http://scielo.senescyt.gob.ec/pdf/alteridad/v14n1/1390-325X-Alteridad-14-01-00026.pdf

Palomé-Vega, G., Escudero-Nahón, A., & Juárez Lira, A. (2020). Impacto de una estrategia b-learning en las competencias digitales y estilos de aprendizaje de estudiantes de enfermería. *RIDE Revista Iberoamericana para la Investigación y el Desarrollo Educativo*, *11*(21), e022. https://doi.org/10.23913/ride.v11i21.726

Pina, A.R. (2004). Blended Learning. Basic Concepts. *Pixel-Bit: Revista de Medios y Educación*, pp. 7–20. https://doi.org/10.5944/ried.21.1.18842

Quintián, S. (2020). *Aspectos pedagógicos para ambientes Blended-Learning*, *7*(1), 60–81. http://dx.doi.org/10.21503/hamu.v7i1.1910

Reinoso, G.L., Castro, A.C., Izquierdo, J.E., & Cornejo, A.N. (2020). El B-learning y su aplicación en la enseñanza universitaria del Ecuado. *Sinergias Educativas*, *5*(2), 227–239. https://doi.org/10.37954/se.v5i2.146

Rianto, A. (2020). Blended Learning Application in Higher Education: EFL Learners' Perceptions, Problems, and Suggestions. *IJELTAL (Indonesian Journal of English Language Teaching and Applied Linguistics)*, *5*(1), 55. https://doi.org/10.21093/ijeltal.v5i1.574

Romero, S.E., & Quintero, J.J. (2018). ENTORNOS FLEXIBLES PARA EL APRENDIZAJE B-Learning Flexible learning environments: B-learning Technology Education B-learning Iterative Flexible. *Revista Internacional de Tecnología*, *7*(1). Retrieved from http://journals.epistemopolis.org/index.php/tecnoysoc

Segovia, N., & Said, E. (2021). Factores de satisfacción de los alumnos en e-learning en Colombia. *Revista Mexicana de Investigación Educativa*, *26*(89), 595–621. Retrieved from http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S1405-66662021000200595&lng=es&tlng=es

Semanate-Quiñonez, H., Upegui-Valencia, A., & Upequi-Valencia, M. (2021). Blended learning, avances y tendencias en la educación superior: Una aproximación a la literatura. *Informador Técnico*, *86*(1), 46–68. https://doi.org/10.23850/22565035.3705

Serrano, D.R., Dea-Ayuela, M.A., Gonzalez-Burgos, E., Serrano-Gil, A., & Lalatsa, A. (2019). Technology-enhanced learning in higher education: How to enhance student engagement through blended learning. *Euro J of Education*. https://doi.org/10.1111/ejed.12330

Suartama, I.K., Setyosari, P., Sulthoni, & Ulfa, S. (2019). Development of an instructional design model for mobile blended learning in higher education. *International Journal of Emerging Technologies in Learning*, *14*(16), 4–22. https://doi.org/10.3991/ijet.v14i16.10633

Yepes-Nuñez, J.J., Urrútia, G., Romero-García, M., & Alonso-Fernández, S. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *Revista Espanola de Cardiologia*, *74*(9), 790–799. https://doi.org/10.1016/j.recesp.2021.06.016