

Effective Strategies for the Implementation of ICT in the Classroom: A Systemic Analysis

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Abstract

A systematic review was carried out on the production and publication of research papers related to the study of Digital Strategies, ICT, Education and Latin America, during the period between 2017 and 2022 under the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) approach. The purpose of the analysis proposed in this document was to know the main characteristics of the publications registered in the Scopus and Wos databases during the study and their scope in the study of the proposed variables, achieving the identification of 64 publications in total. Thanks to this first identification, it was possible to refine the results through the keywords entered in the search button of both platforms, which were Digital Strategies, ICT, Education, Latin America, reaching a total of 20 documents, excluding duplicates and those that did not meet the analysis criteria. The identified scientific publications were analyzed in the hope of knowing the main characteristics of digital strategies based on the resources provided by advances in ICT in terms of education at any level in Latin America, in this way it is intended to analyze the impact that the insertion of technological resources in academic plans and programs has generated in Latin American institutions.

Keywords: *Digital Strategies, ICT, Education, Latin America.*

1. Introduction

In the dynamism present in modern education, the implementation of Information and Communication Technologies known by its acronym ICT has emerged as an essential pillar to improve current systems in education, which is based on being able to redesign the systems of pedagogies implemented in the past and creates an immersive learning environment for students. As soon as we observe how classrooms evolve to meet the demand of the digital age, teachers must be at the forefront of this revolution present in this century, with this we seek that those present take full advantage of the benefits that ICT brings with it to improve the educational experience and maximize the skills necessary for the 21st century.

The concept of ICT in training classrooms encompasses a wide system of technological resources in which we find information tools, devices, educational software, among other components linked to a network. However, it should be borne in mind that the use of

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these information and communication systems does not fully guarantee improvements in learning outcomes. Based on this context, educational institutions, in order to forge the success of these technologies, must implement effective strategies in order to align educational objectives and the basic principles of learning and the pedagogical model, with which a harmonious autocorrelation between traditional teaching and learning methods and digital learning methods is sought.

In order to maximise the benefits of ICT in the classroom, institutions, hand in hand with teachers, must foster an environment of innovation, proactive collaboration and achieve adaptability over time. This not only applies to being able to incorporate the latest technologies, but also to be able to cultivate a mindset of continuous self-learning among educators and students. Based on this premise, it is essential to have professional development programs that seek to provide teachers with fundamental skills to explore and make the most of the benefits of ICT in an effective way. In addition, the physical configuration of the classroom plays a crucial role in facilitating the integration of ICTs. Reliable, high-speed Internet access, well-maintained devices, and ergonomic furniture conducive to collaborative work are critical considerations. By creating a seamless and well-equipped digital ecosystem, educators set the stage for a transformative learning experience.

Effective ICT integration is not a one-size-fits-all approach. Rather, it requires thoughtful alignment with pedagogical objectives, curricular goals, and students' unique needs. Educators need to adopt a holistic approach focused on the needs of each student, exploit the individual abilities of each one and with this, select and implement technological resources according to each need that each student requires. However, being able to find an existing autocorrelation between traditional and digital teaching methods is essential to find a balance and non-dependence on technological resources.

The successful implementation of ICT in the classroom is a collaborative effort that extends beyond the individual teacher. The establishment of professional learning communities aims to enable teachers to impart improvements in educational practices, strengthening problem solving and jointly exploring innovative ways to integrate new technologies. These collaborations of these two teaching methods not only improve efficiency in the classroom, but also play an important role in the use of ICTs, allowing the promotion of a culture of improvement and growth on a continuous scale in the educational community.

2. General Objective

To analyze, from a bibliometric and bibliographic perspective, the production of research papers on the variables Digital Strategies, ICT, Education and Latin America published in high-impact journals indexed in the Scopus and Wos databases during the period 2017-2022.

3. Methodology

The present research is qualitative, according to Hernández, et al., qualitative approaches correspond to the investigations that carry out the procedure of obtaining information to review and interpret the results obtained in these studies; To do this, it searched for information in the Scopus and Wos databases using the words Digital Strategies, ICT, Education, Latin America. (2015)

3.1 Research design

The research design proposed for the present research was the Systematic Review that involves a set of guidelines to carry out the analysis of the collected data, which are

framed in a process that began with the coding to the visualization of theories. On the other hand, it is stated that the text corresponds to a descriptive narrative since it is intended to find out how the levels of the variable affect; and systematic, because after reviewing the academic material obtained from scientific journals, theories on knowledge management were analyzed and interpreted. (Strauss & Corbin, 2016) (Hernandez, Baptista, & Fernandez, 2015)

The results of this search are processed as shown in Figure 1, through which the PRISMA technique for the identification of documentary analysis material is expressed. It was taken into account that the publication was published during the period between 2018 and 2022 without distinction of country of origin of the publication or area of knowledge, as well as any type of publication, namely: Journal Articles, Reviews, Book Chapters, Book, among others.

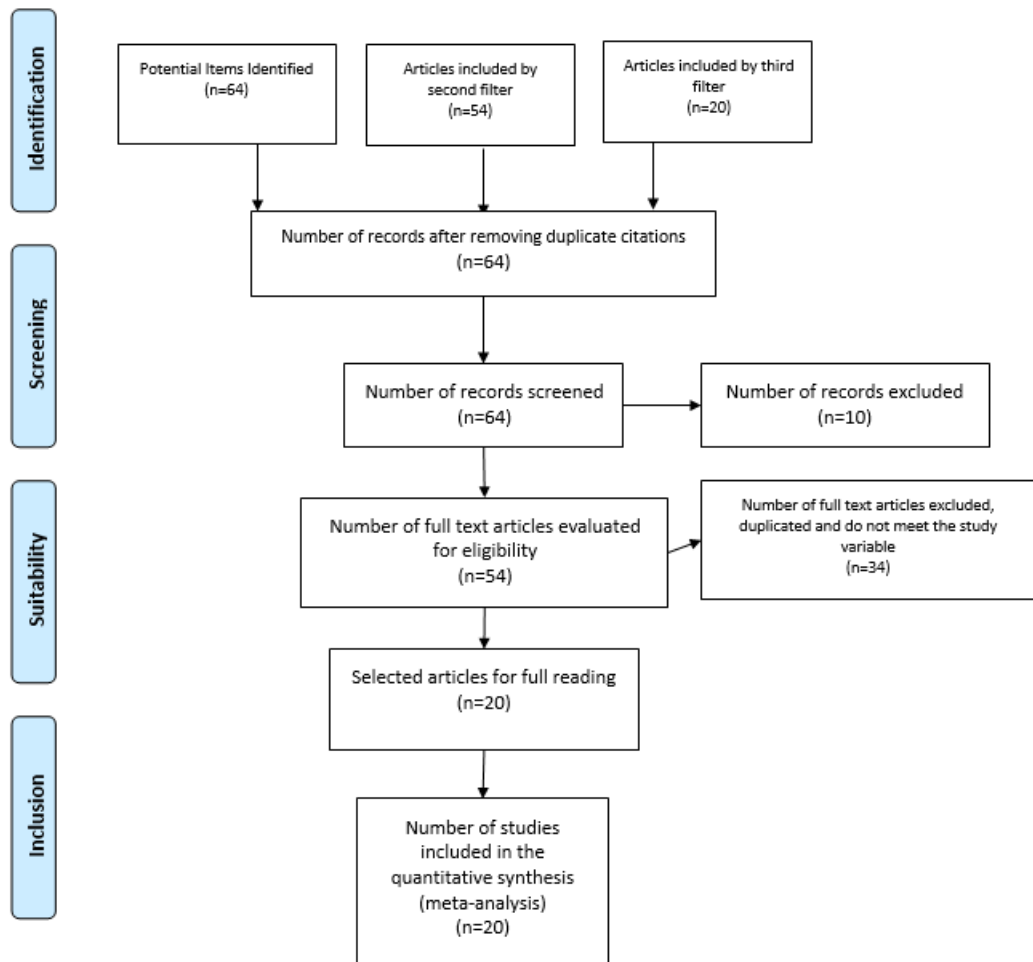


Figure 1. Flowchart of a systematic review carried out under the PRISMA technique (Moher, Liberati, Tetzlaff, Altman, & Group, 2009)

Source: Authors' own creation; Based on the proposal of the Prisma Group (Moher, Liberati, Tetzlaff, Altman, & Group, 2009)

4. Results

Table 1 shows the results after applying the search filters related to the methodology proposed for this research, after recognizing the relevance of each of the referenced works.

No.	RESEARCH TITLE	AUTHOR/YEAR	COUNTRY	TYPE OF STUDY	INDEXING
1	A Roadmap for Digital Transformation of Latin American Universities	Martínez-Pérez, S., & Rodríguez-Abitia, G. (2021).	MEXICO, SPAIN	QUALITATIVE	SCOPUS
2	A teacher training workshop to promote the use of the VISIR remote laboratory for electrical circuits teaching	Arguedas-Matarrita, C., Concari, S. B., García-Zubía, J., Marchisio, S. T., Hernández-Jayo, U., Alves, G. R., ... & Elizondo, F. U. (2017, June)	ARGENTINA, COSTA RICA, SPAIN, PORTUGAL	QUALITATIVE	SCOPUS
3	A meta-analysis of ICT-based education in Mexico and Latin America	Navarro Ibarra, L. A., Cuevas Salazar, O., & Martínez Castillo, J. (2017).	MEXICO	QUALITATIVE	SCOPUS
4	Teaching Digital Competence in Higher Education. A Comprehensive Scientific Mapping Analysis with Rstudio	Cisneros-Barahona, A., Marqués Molías, L., Samaniego Erazo, G., Uvidia-Fassler, M., de la Cruz-Fernández, G., & Castro-Ortiz, W. (2022, October).	ECUADOR, SPAIN	QUALITATIVE	SCOPUS
5	Where should the ICT training go at the Inter-American School of Librarianship? A look from library education programs in Latin america and global trends	Castaño-Muñoz, W., Munera-Torres, M. T., & Uribe-Tirado, A. (2018).	COLOMBIA, SPAIN	QUANTITATIVE	SCOPUS
6	Information and communication technologies in knowledge management in higher education institutions	Fernandez, V.J.F; Garcia, C.E.Z; Oltra, G.E.Y; Aumaître, J.V.C.	VENEZUELA	QUALITATIVE	SCOPUS

	in Latin America	(2022)			
7	Educational innovation with ict in latin american universities: Multi-country study	Deroncele-Acosta, Á., Medina-Zuta, P., Goñi-Cruz, F. F., Román-Cao, E., Montes-Castillo, M. M., & Gallegos-Santiago, E. (2021)	PERU, ECUADOR, MEXICO	QUALITATIVE	SCOPUS
8	Gender digital divide and education in latin america: A literature review	Ancheta-Arrabal, A., Pulido-Montes, C., & Carvajal-Mardones, V. (2021).	SPAIN	QUANTITATIVE/QUALITATIVE	SCOPUS
9	; [Teacher perspectives for a critical agenda in post-COVID-19 media education. I am a student	Mateus, J. C., Andrada, P., González-Cabrera, C., Ugalde, C., & Novomisky, S. (2022)	PERU, CHILE, ECUADOR, ARGENTINA	QUALITATIVE	SCOPUS
10	Technology and innovation management in higher education—cases from latin america and europe	Arciénaga Morales, A. A., Nielsen, J., Bacarini, H. A., Martinelli, S. I., Kofuji, S. T., & García Díaz, J. F. (2018)	ARGENTINA, BRAZIL, DENMARK	QUALITATIVE	SCOPUS
11	Digital literacies and practices from youth agency. Challenges for education in Chile; [Digital Literacies and Practices from Youth Agencies. Challenges for education in Chile	Valdivia, A., Brossi, L., Cabalin, C., & Pinto, D. (2019).	CHILE	QUALITATIVE	SCOPUS

12	INFORMATION AND COMMUNICATIONS TECHNOLOGIES IN THE CONSOLIDATION OF HIGHER DISTANCE EDUCATION IN LATIN AMERICA	Luna-Romero, AE; Jaramillo, FYV and Romero, MEL (2019)	ECUADOR	QUALITATIVE	WOS
13	The Integration of ICT in the Higher Education curriculum in the Last decade (period 2009-2019)	Cruz-Perez, MA; Pozo-Vinueza, MA; (...); Sánchez-Ramírez, RH (2020)	ECUADOR, CUBA	QUANTITATIVE	WOS
14	Leading Change in Educational Institutions for Technology Adoption in Latin America	Avitia Carlos, P., Rodríguez Tapia, B., & Candolfi Arballo, N. (2020).	MEXICO	QUANTITATIVE	WOS
15	Employment and the gender digital divide in Latin America: A decomposition analysis	Galperin, H and Arcidiacono, M (2021)	ARGENTINA, UNITED STATES	QUANTITATIVE	WOS
16	ICT AND ITS SUPPORT IN UNIVERSITY EDUCATION IN TIME OF PANDEMIC: FACTO - THEORETICAL FOUNDATION	Delgado, W. A., Bautista, K. J. G., & Camacho, L. M. (2021)	PERU	QUALITATIVE	WOS

17	Impact of digital technologies upon teaching and learning in higher education in Latin America: an outlook on the reach, barriers, and bottlenecks	Okoye, K., Hussein, H., Arrona-Palacios, A., Quintero, H. N., Ortega, L. O. P., Sanchez, A. L., ... & Hosseini, S. (2023).	MEXICO, COLOMBIA, UNITED STATES	QUANTITATIVE	WOS
18	Learning with ICT to teach with ICT in the Dominican Republic. The Digital Republic Education program	Garcia, CM; Burgos, DR; (...); Nero, JFJ (2019)	SPAIN, DOMINICAN REPUBLIC	QUANTITATIVE	WOS
19	Training and Educational Innovation: An Evaluative Perspective of the Digital Teaching Competence	Pinto-Santos, A., Reyes, C. G., & Cortés-Peña, O. (2022).	COLOMBIA, MEXICO	QUANTITATIVE	WOS
20	Learning Services for Web E-learning in the Workplace	López, V., Díaz, O. G. F., Salgado, R. S., Pérez, J. C. R., & Serna, J. G. G. (2019)	MEXICO	QUANTITATIVE	WOS

Table 1. List of articles analysed

Source: Authors' own creation

4.1 Co-occurrence of words

Figure 2 shows the relationship between the keywords used to search for the study material for the systematic analysis proposed for this research.

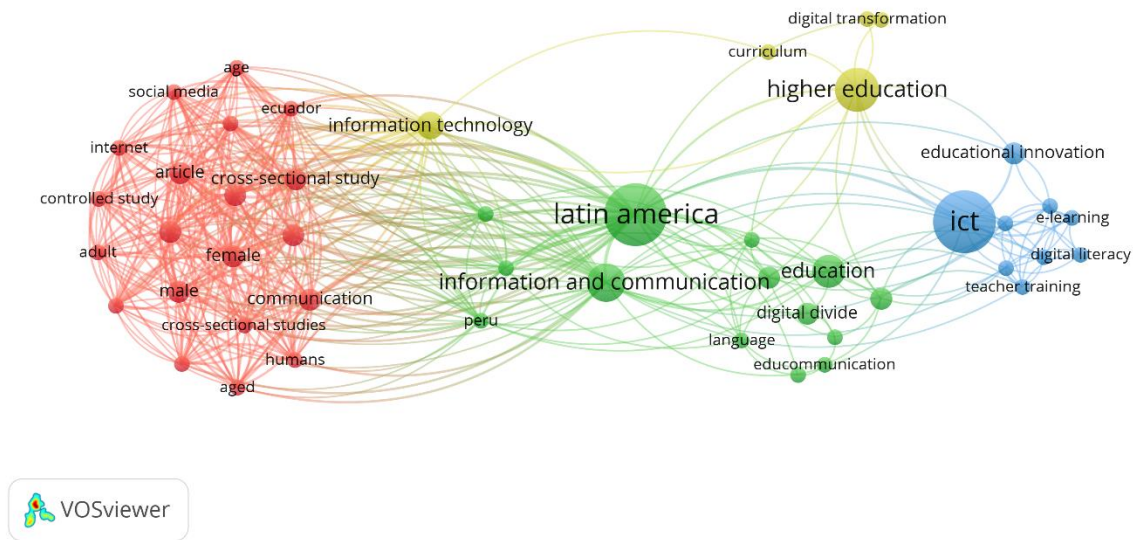


Figure 2. Co-occurrence of keywords.

Source: Authors' own creation

Figure 2 shows the most frequently used keywords and their correlation with research on topics associated with the problems of Digital Strategies, ICT, Education and Latin America. In this way, it is possible to affirm that Information and Communication constitutes the central axis of the research identified for the analysis developed in this article, directly related to research in Latin America, Learning Analysis, ICT, Education and Innovation, Students, Virtual Learning Environments, Higher Education, among others, which allow to confirm the relevance of the data analyzed in compliance with the proposed objective. One of the events generated by the benefits of using Information and Communication Technologies in the classroom is a diverse task which requires meticulous planning, flexible and continuous integration. The strategies outlined in this discussion underscore the importance of aligning ICT initiatives with educational goals, providing comprehensive teacher training, ensuring equitable access to technology, and fostering a dynamic and collaborative learning environment. a clear understanding of educational objectives is crucial to successfully integrate ICT tools into the curriculum. In a technology-driven world, students must not only be consumers but also competent producers and critical evaluators of information. The digital tools available in the classroom facilitate the development of essential skills such as critical thinking, problem-solving, creativity and digital literacy, competencies that are increasingly vital to success in the world of work.

4.2 Discussion

The purpose of this article was to analyze, from a systematic perspective, the contribution of the authors through their publications, to the study of the problems of Digital Strategies, ICT, Education and Latin America, carried out in high-impact journals indexed in Scopus and Wos databases during the period 2018-2021 by authors affiliated with Latin American institutions. In this way, it is possible to affirm that the publications indicated in the body of this document have carried out research at different levels whose findings contribute to the generation of new knowledge regarding the variables proposed for this study, this is how great contributions are identified, as contemplated in the article entitled "A meta-analysis of ICT-based education in Mexico and Latin America". The aim of this study is to conduct a meta-analysis of the state of knowledge of ICT-based education in

Mexico and Latin America in the last decade. Prior to the search for information, general lines of application of knowledge and categories were defined. The results indicate that the studies focus mostly on virtual learning resources and their contribution to education. Similarly, it was found that 80% of the studies are qualitative, with quantitative or mixed studies accounting for only one-fifth of the studies on the subject. In Mexico, 46% of research deals with higher education; this figure is 62% in Latin America. Gaps were found in the generation of knowledge in parents' digital skills, students' training in ICT competencies, educational linkage with companies, and disability education. Therefore, it is absolutely necessary to know first-hand the real needs of them in order to line strategies that pursue success within their training. Supporting the above idea, the contribution made by the development of the article entitled "Technology and Innovation Management in Higher Education: Cases from Latin America and Europe" is evidenced. The main objective of this study is to analyze different cases from Europe and Latin America in order to synthesize a model of technology and innovation management. Conceptually, the model focuses on competencies, tools, skills, and behaviors. From this knowledge base, we derive a new learning model for higher education, using an organizational framework. Our learning model includes different ways to gain a panoply of competencies to identify technology and innovation management problems at the individual and regional enterprise level, particularly for small and medium-sized enterprises (SMEs). The model addresses innovation challenges related to new innovative relationships and product opportunities arising from traditional sectors, but also from the fields of nanotechnology, biotechnology and ICT, with particular emphasis on environmental and sustainability issues. We suggest that our two models can serve as a basis for designing a master's degree curricular program for higher education, in accordance with Latin American and European realities. However, as any methodology, it is not exempt from presenting problems through its use, as shown in the article entitled "Leading the change in educational institutions for the adoption of technology in Latin America" This study aims to identify representative programs of integration of ICT in education present in recent decades in Latin America. as part of the interpretation and adaptation of public policies to the context. Bibliographic techniques were used to analyze the trends that have been followed in the region in terms of educational management for the adoption of ICTs. As a result, more than 70 articles from scientific journals, four databases, and three government websites were analyzed. They show an awareness of the relevance of ICTs for innovation and the existence of strategic programs to reduce gaps in access and use. However, there is also the existence of a challenging context characterized by socioeconomic inequities. In general, the influence of public policy on the promotion of these programs is observed, as well as the need for a theoretical-methodological basis for the development of a comprehensive management model, in which the technological component does not constitute a parallel item. The management of educational institutions is crucial to normalize experiences and provide references that can be integrated into the conditions of the environment.(NAVARRO IBARRA & CUEVAS SALAZAR, 2017)(Antonio Adrián Arciénaga Morales, 2018)(Patricia Avitia Carlos, 2020)

5. Conclusions

This review article concludes by highlighting the importance of knowing the updated status of the bibliography published in databases such as Scopus or Wos, referring to the study of the problems of Digital Strategies, ICT, Education and Latin America during the period between 2018 and 2021, and how the implementation of digital tools within academic training processes has had a positive impact. However, it has also been important to highlight those problems within their use, identified by the authors cited here, as recorded in the body of this article. The strategies outlined in this article underscore the importance of being able to align ICT initiatives with educational

objectives. This correlation ensures that the technology factor serves as a means to enrich and amplify the teaching methods implemented in the past. The proper training of teachers offers these professionals a new horizon in which the successful incorporation of the appropriate use of ICTs is sought. These, in turn, need continuous training in order to learn about the benefits of these cutting-edge technologies, as well as to develop new pedagogical strategies and thus improve teaching practices. Offering a continuous culture of training is essential for educators to be aware of the academic resources offered by ICTs and in turn to allow them to implement these resources in an increasingly changing training classroom in a more effective way. However, these emerging technologies are not exempt from challenges, one of which is collective equity in schools, which seeks in the first instance to ensure that all students have access to technological resources and can enjoy their benefits. For this reason, it is important for the education sectors to be able to close the technological and economic gaps that are currently present, in order to promote an inclusive approach, which helps prevent the exacerbation of educational inequality and promote a more equitable landscape. However, it is important to create dynamic and changing learning spaces where, together with new technologies, the aim is to maximise the emerging impact of the use of ICTs in education. This seeks to look at new educational horizons where learning experiences are project-based and centralized in which students take full advantage of the benefits of these technologies, which seeks to promote critical thinking, innovation and teamwork. Likewise, the integration of collaborative platforms and didactic tools offers students a much more dynamic learning method which promotes autonomous and active learning, where access to information is at the students' fingertips, with this seeking to promote a more participatory and immersive learning experience.

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