

ARTICLE

## THE DIGITAL TRANSFORMATION IN BLENDED EDUCATION – WHAT ARE WE DOING IN LATIN AMERICA?<sup>1;2</sup>

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**ABSTRACT:** The digital transformation in education was strongly driven by the COVID-19 pandemic that started in 2020. Despite this event having generated advances for the faster adoption of new technologies, the fact is that many countries and institutions were already dedicating efforts to promote this transformation, for example with the adoption of blended education. Each global region has specific characteristics that can impact the way this process occurs. In this sense, this study sought to identify how far we are advancing in Latin America in terms of Digital Transformation and Blended Education based on the analysis of publications in the Scopus database. In order to achieve this goal, a systematic literature review was carried out in the Scopus database over a period of 15 years, thus seeking to identify studies before the pandemic itself. The search was carried out without the delimitation in Latin America and 111 were identified that were submitted to a bibliometric analysis. This analysis allowed the identification of only seven articles that had the first author linked to an institution in the region. None of the other articles, from other regions, researched the context of Latin America. These seven articles were then considered for the discussion of the reality of the region. It was found that the small number of studies on the region does not allow an effective understanding of how this process is taking place. In this way, an opportunity was identified for future studies that address the Latin American reality.

**Keywords:** Digital transformation, Blended education, Literature review, Latin America.

### A TRANSFORMAÇÃO DIGITAL NA EDUCAÇÃO HÍBRIDA – O QUE ESTAMOS FAZENDO NA AMÉRICA LATINA?

**RESUMO:** A transformação digital na educação foi fortemente impulsionada pela pandemia de covid-19 iniciada em 2020. Apesar deste evento ter gerado avanços para a adoção mais rápida de novas

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tecnologias, o fato é que muitos países e instituições já estavam dedicando esforços para promover esta transformação, por exemplo, com a adoção da educação mista. Cada região global possui características específicas que podem impactar a forma como esse processo ocorre. Nesse sentido, este estudo buscou identificar até que ponto estamos avançando na América Latina em termos de Transformação Digital e Educação Híbrida a partir da análise das publicações na base de dados Scopus. Para atingir esse objetivo foi realizada uma revisão sistemática da literatura na base de dados Scopus ao longo de um período de 15 anos, buscando assim identificar estudos anteriores à própria pandemia. A busca foi realizada sem a delimitação na América Latina e foram identificados 111 que foram submetidos à análise bibliométrica. Esta análise permitiu a identificação de apenas sete artigos que tinham o primeiro autor vinculado a uma instituição da região. Nenhum dos demais artigos, de outras regiões, pesquisou o contexto da América Latina. Esses sete artigos foram então considerados para a discussão da realidade da região. Verificou-se que o pequeno número de estudos sobre a região não permite uma compreensão efetiva de como esse processo está ocorrendo. Desta forma, identificou-se uma oportunidade para estudos futuros que abordem a realidade latino-americana.

**Keywords:** Transformação digital, Educação híbrida, Revisão de literatura, América Latina.

## LA TRANSFORMACIÓN DIGITAL EN LA EDUCACIÓN MIXTA – ¿QUÉ ESTAMOS HACIENDO EN AMÉRICA LATINA?

**RESÚMEN:** La transformación digital en la educación estuvo fuertemente impulsada por la pandemia de covid -19 iniciada en 2020. A pesar de que este evento ha generado avances para la adopción más rápida de nuevas tecnologías, lo cierto es que muchos países e instituciones ya estaban dedicando esfuerzos para impulsar esta transformación. por ejemplo con la adopción de la educación mixta. Cada región global tiene características específicas que pueden impactar la forma en que ocurre este proceso. En este sentido, este estudio buscó identificar hasta dónde estamos avanzando en América Latina en materia de Transformación Digital y Educación Semipresencial basado en el análisis de publicaciones en la base de datos Scopus. Para lograr este objetivo se realizó una revisión sistemática de la literatura en la base de datos Scopus durante un período de 15 años, buscando así identificar estudios anteriores a la propia pandemia. La búsqueda se realizó sin delimitación en América Latina y se identificaron 111 que fueron sometidos a un análisis bibliométrico. Este análisis permitió identificar sólo siete artículos que tuvieron el primer autor vinculado a una institución de la región. Ninguno de los otros artículos, de otras regiones, investigó el contexto de América Latina. Estos siete artículos fueron luego considerados para la discusión de la realidad de la región. Se encontró que el pequeño número de estudios sobre la región no permite una comprensión efectiva de cómo se está dando este proceso. De esta manera, se identificó una oportunidad para futuros estudios que aborden la realidad latinoamericana.

**Palabras clave:** Transformación digital, Educación semipresencial, Revisión de literatura, América Latina.

## INTRODUCTION

Education enhances regional development (Peer & Penker, 2016, Marrocu & Paci, 2012). At all levels, education supports regional development. Education empowers people through the improvement and scientific qualification to meet regional demands that drive its development (Sousa & Freiesleben, 2018). For example, educational institutions promote knowledge production that can support the region stakeholders in several activities (Harrison & Turok, 2017) while graduates from universities and colleges are more likely to attain a well-paid job (Frenkel & Leck, 2017).

At the same time, technology reveals itself as an engine of economic growth, provoking incentive measures and support for technological development (Giron & Amorin, 2007). Technology is

a broad term that essentially comprises the application of methods, techniques, and tools for the practical use of scientific knowledge, allowing the solution of problems and the development of society. In this sense, technology presents itself as an opportunity for the development of education, in special, the development of distance education. The presence of technology started to promote dialogues between the subjects involved in the teaching and learning process, in addition to fostering strategies for the democratization of teaching (Baxto, Amaro, & Mattar, 2019; Souza, 2022).

Technological advances in education can be seen in Blended Education processes which go beyond face-to-face and non-face-to-face interaction and, as it is a strategy that promotes learning through the dynamics of resources, it becomes a system responsible for involving different spaces, time, technology, and pedagogical procedures (Rodrigues, 2015).

Blended Education represents one way in an evolutionary process, and it is present in the reality of education and positively implies the dissemination of knowledge (Alves, 2011; Rodrigues, 2015). It is possible to perceive the transformation in distance education, from correspondence courses, aided by the printed media, to e-learning modalities, promoted by technological advances, mainly via the Internet in addition to new learning environments, including virtual ones.

The COVID-19 pandemic pushed the adoption of technologies to support the educational process. As presented by Radaelli, Goulart & Astudillo (2022), the year 2020 represented a new moment for education in Brazil, and its technological impacts will remain perceived. The emergency remote teaching imposed adjustments and adaptations, and the use of technology has altered the teaching-learning process (Sahu & Samantaray, 2022).

In recent years, discussions about the process of digital educational transformation through the adoption of Distance Learning (Nass *et al.*, 2021) and new technologies (Kuhn *et al.*, 2021) have been conducted. The benefits of this process, such as the expansion of teaching capacity in the pre-pandemic context (Jost *et al.*, 2021) or even during it, have been analyzed (Bebbington, 2021). However, Digital Transformation was not a relevant topic in studies on education in Latin America. The covid-19 pandemic changed this reality (Muñoz *et al.*, 2021). Kulikova and Yakovleva (2022) highlight the need to better understand the digital educational environment, since despite all the benefits of technology, difficulties are inherent in this process (Abramova & Shishmolina, 2021).

A way of researching the advancement of knowledge on a topic is through the investigation of scientific databases. One of these databases is Scopus, provided by the publisher Elsevier. With publications that date back to 1970, this database contains more than 2 billion publications, reaching more than 19 million authors. Furthermore, it concentrates works from more than 7 thousand publishers around the world, being a base with global reach. The offer of search filters, associated with the broad coverage of publications, allows this database to reveal a comprehensive view of scientific publications on different topics.

Despite controlling the spread of the virus and returning to face-to-face classes, two challenges emerge in the current scenario. The first is the possibility of a similar event in the future and the need to be more prepared for this situation. The second does not imply the need for a negative future event to occur, but places technology as a protagonist in the teaching-learning process, considering that the post-pandemic scenario cannot go back to the past. The adoption of technologies was a successful practice, and the better use of technology in the future could significantly contribute to the development of society. In this sense, blended education processes reveal themselves as an opportunity to improve the teaching-learning practice by combining the benefits of face-to-face practices with the use of technology in remote moments. However, within an expanded perspective, it is not possible to identify how studies that relate to Digital Transformation and Distance Education have evolved in view of the limitations of integrative studies. However, how far are we advancing in Latin America in terms of Digital Transformation and Blended Education based on the analysis of publications in the Scopus database?

In this sense, there is an opportunity to understand how studies on Digital Transformation through Blended Education have evolved through a systematic literature review that allows us to identify advances in Latin America. Given the impact of the pandemic on education, it was decided to carry out a systematic literature review from 2007 to 2022, thus comprising 15 years of publications. In this sense, it would become possible to understand the evolution of studies in the area before the COVID-19 pandemic, as well as its reflexes in the most recent publications.

## **DIGITAL TRANSFORMATION**

Digital Transformation (DT) has become an emergent topic in the organizational environment in recent years, but not everyone has a clear understanding of what this phenomenon represents, especially in academic terms (Carvalho *et al.*, 2021). According to Vial (2019), DT represents a process where digital technologies are used to create disruptions in a company's business model to alter its value creation patch. From a broad perspective, it represents the profound changes that are taking place in society based on the use of digital technologies (Majchzak, Markus, & Wareham, 2016).

DT can be understood through the analysis of the type of technological use used in organizational activities, which represents the phases of the DT process, namely: digitization; digitalization; and the DT itself (Verhoef *et al.*, 2021). While digitization involves the simple conversion of analog data into digital information, digitization comprises the use of applied technology to optimize business processes. DT, on the other hand, represents the effective transformation of organizations through innovation in business models with the use of technology applied directly to the establishment of a different way of creating, offering, or capturing value (Pagani & Pardo, 2017).

Carvalho *et al.* (2021) highlight the need to expand discussions on DT through different perspectives, especially because of the challenges imposed by the COVID-19 pandemic and its organizational impacts. External factors drive DT, such as digital technologies, the level of competition, and consumer behavior itself (Verhoef *et al.*, 2021). More recently, the COVID-19 pandemic accelerated the use of teaching technologies, promoting a process of DT in educational institutions (Ng, 2022; Bhadri & Patil, 2022).

## **BLENDED EDUCATION**

Blended Education (BE) represents the combination of the benefits of learning in the classroom and studying with online resources (Davis, Eickelmann, & Zaka, 2013). It has become a communicative process full of complexities, having been strongly driven by new technologies and the pandemic from 2020 onwards. According to Christopoulos *et al.* (2022), BE can promote different interactions, flexibility, and innovation. From its ability to integrate theory with practice to promote learning, in the classroom or outside, it becomes a fundamental piece in the transformation processes of teaching and learning (Ciudad-Gómez, Valverde-Berrocoso, & Coca-Pérez, 2014). To Roza, Veiga, and Roza (2019), the personalization of everyone's experience with multiple technological possibilities in promoting massive adaptation between the physical world and the virtual world is one of the results of BE. Furthermore, it promotes better learning outcomes (Samoilă, Ursuțiu, & Jînga, 2016), with visionary, disruptive, fundamentally flexible characteristics (Van Der Perre, 2015).

BE democratizes learning, allows personalization, and promotes independence (Bhadri & Patil, 2022; Farid & Ebad, 2018). It also results in the expansion of access and development through education, qualifying it, making it innovative, accessible, and attractive in the face of current challenges, as well as the demands of an increasingly technological and competitive labor market (Chuchalin, 2018; Clifft & Assiouras, 2022) directly affecting academic environments (Alotaibi, 2022).

Sudirta *et al.* (2022) consider that BE is responsible for expanding student autonomy. Moreira and Lima (2023) state that, in addition to being democratic, it becomes globalizing, allowing different uses according to the profile, needs, and objectives of each reality and teacher, combining the in-person classroom with remote moments, at different times and spaces; synchronous moments, with the presence of teachers and students on digital platforms in different locations and spaces; in-person and remote moments within the school environment, combining the traditional classroom with different activities using different technological resources; face-to-face classes with activities carried out online, in teams, without restrictions on geographic space; use of tutorials, in which students enjoy face-to-face moments and also rely on tutors to carry out tasks and activities.

## RESEARCH METHOD

A systematic literature review (SLR) requires the adoption of a systematically planned process that manages to reduce the potential for bias and ensure that the conclusions represent the state-of-the-art on the topic (Williams Jr. *et al.*, 2020). In addition, it is necessary to define the source of origin of the articles and what are the inclusion and exclusion criteria. Thus, to ensure the technical rigor of the research process, the method proposed by Briner and Denyer (2012) was used.

First, a theoretical review of the themes was developed and, later, the research protocol was elaborated. The Scopus database was chosen as the source for the research and the research period was 15 years, from July 2007 to July 2022, and later complemented until December 2022.

The identification of the research universe was carried out on July 16, 2022, with an advanced search query in the Scopus database using the keywords “blended education” and “digital transformation”. It was decided not to delimit the research in Latin America, since in this way it would be possible to have a broader perspective of the studies so that, later, the analysis would be made only of those that consider this region. As a result, 100 articles were identified as an initial sample. The selection of articles considered as inclusion criteria (1) having been published in a journal or scientific congress, as well as (2) addressing the relationship between blended education and digital transformation. After reading the abstracts by two researchers, eleven articles were excluded because they did not fit the scope of the research, one was excluded because it was just an abstract and not a full article, four were excluded because they were book chapters, and one was excluded because the date of publication was prior to July 2007. Thus, the sample of analyzed articles totaled 83 publications. Reading the abstracts led the researchers to confirm the need for research from a global perspective so that later the delimitation of analysis of studies focusing on Latin America could be carried out.

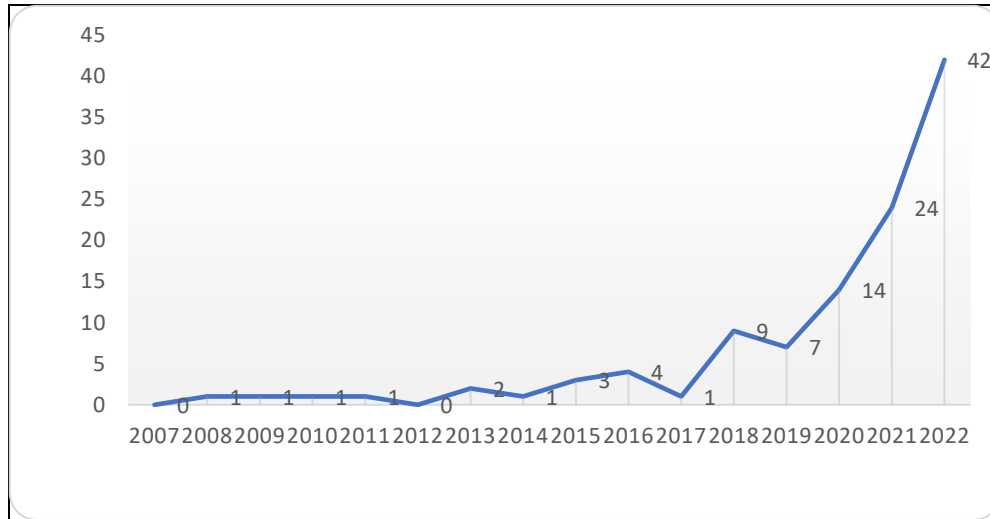
In March 2023, we did a second research at Scopus in order to complete the year 2022. A total of 30 new articles were identified. After reading the abstracts, two were excluded – one was a technical report and the other one was a book chapter. Based on the new findings, our final sample increased to 111 articles.

Thus, it was decided to carry out a bibliometric analysis, starting by considering all 111 articles, and after this analysis, the discussion of the seven articles that were developed by researchers from institutions in the region's countries was effectively carried out. By reading the abstracts and consulting the manuscripts, we also sought to identify studies whose first author was not linked to an institution in the region, but whose object of investigation included it. No article with this profile was identified.

## BIBLIOMETRIC ANALYSIS

The analysis of the information collected begins with the distribution and presentation of scientific articles found in the databases by year of publication. It is possible to notice that the publications, from 2008 onwards, follow a continuous flow until 2012, the year in which the topic is not relevant to the scientific community. From 2012 onwards, there is a fluctuating interest until the year 2017. From that period on, it is possible to notice a sharp growth involving the theme, reaching the highest peak in 2022 (Figure 1).

**Figure 1 – Publications per year**



Source: Elaborated by the authors based on the collected data.

Although technologies have become unavoidable elements in the development of society and consequently in the teaching and learning processes, it is possible to perceive that the peak of academic production regarding a virtual or mixed learning process occurred mainly during a pandemic moment. Thus, even in the face of all the movements produced by the UNESCO reports, in Cardoso, Pestana, and Castrelas (2021) on the importance of Information and Communication Technologies (ICT) in education, there is still a reorganization and adaptation to the processes that combine traditional education with virtual learning environments (NASS *et al.*, 2021).

Regarding the type of publication, among the 111 articles selected, 47 were published in congresses and 64 in different journals. In the sequence, the number of authors per publication was analyzed. Of the total, 18 articles have only one author. Thirty-four articles were prepared with 2 authors, representing 31% of the total of selected articles; 30 articles were developed with 3 researchers, representing 27%; 15 articles were prepared with 4 authors, that is, 13%; 8 articles were published with 5 authors, representing 7% of the total of articles, and 6 articles were published with more than 5 authors, representing 5.4% of the total of selected articles (Table 1).

**Table 1 – Number of authors per publication**

Number of authors	Number of articles
1 author	178
2 authors	34
3 authors	30
4 authors	15
5 authors	8

6 authors	3
7 authors	1
8 authors	1
10 authors	1
Total	111

Source: Elaborated by the authors based on the collected data.

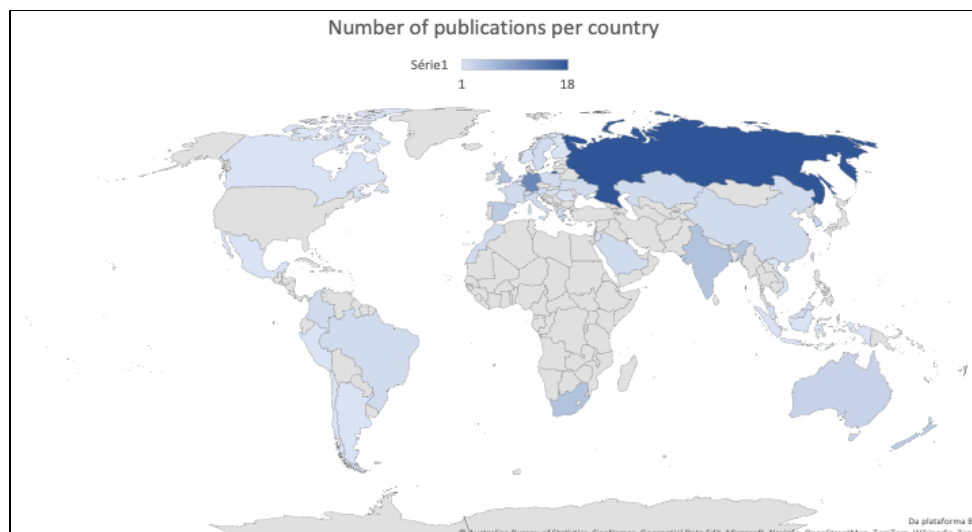
The analysis continued with the analysis of publications. Regarding publications in congresses, publications in 36 different events were identified. The “International Conference on Interactive Collaborative Learning” and the “International Conference on Technology Enhanced Learning in Higher Education (TELE)” were the space for three publications.

Regarding journals, 48 different publications were identified. The maximum number of publications in the same journal was two, found in: “Educational Studies”; “International Journal of Educational Technology in Higher Education”; “Journal of Teaching in International Business”; “Perspectives of Science and Education”; “Higher Education in Russia”; “International Journal of Environmental Research and Public”; “Journal of Engineering Education Transformations”; “Perspectives of Science and Education”; and, “Sustainability”.

The analysis proceeds with the investigation of the most cited articles. According to information from the database itself: 65 articles have citations. The most cited article is by Davis, Eickelmann, and Zaka (2013), published in the Journal of Computer Assisted Learning, entitled Restructuring of Educational Systems in the Digital Age from a co-evolutionary perspective, with 116 citations found in Google Scholar and 35 in Scopus, totaling 151 published articles. This article deals with the recurrent requests for restructuring teaching to take advantage of information and communication technologies (ICT) within schools, supporting innovative strategies based on blended and online learning in New Zealand and the USA.

In Figure 2 it is possible to observe the location of Higher Education Institutions to which the first author of each selected scientific article is linked. Thus, institutions located in Russia stand out through the color scale, where dark blue indicates the largest number of publications, and light blue the smallest number of linked publications. Table 2 presents the total number of articles and the countries of the institution of the first author.

**Figure 2 – Location map of Higher Education Institutions**



Source: Elaborated by the authors based on the collected data.

**Table 2 – Publications per country**

Countries	Number of articles
Russian Federation	18
Germany	12
South Africa, India, United Kingdom	5
Spain, New Zealand	4
Australia, South Korea	3
Austria, Brazil, China, Colombia, France, Greece, Italy, Kazakhstan, Malaysia, Morocco, Poland, Saudi Arabia, Sweden, Switzerland, Taiwan, Ukraine, United Arab Emirates	2
Argentina, Bahrain, Belgium, Brazil, Canada, Chile, Finland, Hong Kong, Hungary, Indonesia, Jamaica, Jordan, Mexico, Netherlands, Norway, Palestine, Peru, Romania, Vietnam	1

Source: Elaborated by the authors based on the collected data.

From this analysis, it was possible to identify that, of the total of 111 publications, only seven have the first author linked to an educational institution located in Latin America. Seeking to broaden the basis for analysis in this region, the focus of each of the 104 articles was verified and none of them presented the Latin American region as a research environment. Thus, the analysis proceeded from this small sample identified.

## THE REALITY IN LATIN AMERICA

The first publication focused on Latin America was published in 2016 by Trujillo Maza et al. (2016). The authors developed a case study to analyze how the use of digital technologies could contribute to the development of competence-based teaching. The object of study was second-year medical students at the Universidad de los Andes. The investigation comprised the analysis of the curricular structure, training, and skills, the educational model, and the learning environments used during the course. The initiative for the development of the study came from the fact that the association between digital technologies and teaching methods based on competencies was being used to review the curricula of the medical course in several as a way of motivating students through flexible and encouraging approaches, for the development of professional competences. Different data sources were used: documents, interviews, focus groups, and surveys. As a result, the authors identified that digital technologies help the curriculum review process while promoting student flexibility and autonomy. Also, cognitive, technical, procedural, integrative, communication, reflective, and professional skills were more easily developed with the new study format based on hybrid education.

This is a peculiar study because it reports only one teaching experience, in a university and for a specific course. Despite this, considering the year of publication, it becomes an important report to be able to identify that digital transformation efforts through blended education were already being developed in the region before the COVID-19 pandemic. It is worth noting that, throughout the text, the authors mention that this transformation process was taking place in other institutions, as well as in companies. The article cites the publication by Márquez and Jiménez-Rodrigo (2014) to support those previous studies that have already highlighted the opportunity to use the blended education approach as



a tool to transform the pedagogical process. This specific article is not indexed in the Scopus database, so it did not understand the investigation unit of this research. However, it raises the alert for the need to expand the research with the use of other databases, given that there may be non-indexed local publications that have addressed digital transformation and blended education, and which have not been identified in the selection of articles.

Another important fact is that this was the only article identified in the period prior to 2020. Despite this, the publication by Astudillo and Martín-García (2020), published in the year the pandemic began, has no relation to this event. Astudillo and Martín-García (2020) are linked, respectively, to a Brazilian and a Spanish institution. The authors developed a theoretical article to deepen knowledge about the adoption and effectiveness of blended education in higher education. They start from the study of activity theory as an integrative interdisciplinary basis for the social, pedagogical, and technological elements of blended education. Since they consider that digital technologies represent an imperative for higher education, the authors conclude that activity theory represents an approach to permanent evolution, proving to be adequate for the understanding of digital transformations in education.

This article does not address the context of a region at any time. The theoretical discussion is kept purely in the study of the theory itself, and it is not possible to identify an effective contribution to the understanding of the Brazilian or Latin American environment.

Beserra *et al.* (2021) is the only publication from a congress among the five analyzed and, despite the publication after the beginning of the pandemic, the object of study comprises the period before it. The authors carried out an experiment with 59 students from the penultimate year of high school in Brazilian and Chilean schools. Despite the collection in two countries, the research does not have a comparative character. According to the authors, carrying out the experiment in both countries sought to expand the research validation process. The objective of the research was to understand the use of digital environments in education, especially the application of blended learning methods that use multiple screens. Students participated in a flipped classroom aimed at teaching English for two weeks, experimenting with the use of Digital Television and smartphones. According to the survey data, students improved their English skills among other students comparing the pre and post-test periods. However, despite the students being concentrated during the experiment, the level of attention decreased in the second half of the interaction period with the video on Digital Television inside the classroom.

The object of this research reveals again a report of an experience with students. This time, however, the study included two countries, expanding the possibility of knowledge about the Latin American region. Throughout the article, the authors do not discuss regional aspects that could somehow impact the experiment. This analysis could contribute to future studies on the region. Still, this article is relevant as it is the only one to consider at the high school level. All other empirical studies in the region investigated higher education.

In fact, the need for studies at the elementary and middle levels is revealed here, as well as the expansion of studies at the high school level. Despite being more investigated in the context of higher education, digital transformation, and blended education are by no means restricted to this level of education. If during the period of social isolation, children and adolescents also need to continue studying remotely, and if technology is a reality for all educational levels, it is essential that studies are developed to analyze this context.

The fourth publication, Galvis and Carvajal (2022), presents an investigation into the use of alternative teaching modalities to face-to-face in higher education, thus proposing the use of digital and educational technologies to promote educational transformation. According to the authors, these technologies contribute to the development of skills of both professional and personal interest. The survey data collection started in 2018 and was interrupted in 2020 with the beginning of the pandemic. The authors followed the experiences of six educational institutions on three continents that were already

developing educational innovation experiences with the support of technology for some years. Of the six institutions, only two were Latin American – the Pontificia Universidad Católica del Peru and the Universidad de los Andes in Bogotá – Colombia. The analysis of experiences made it possible to identify a set of actions that ensure the success of educational experiences from the educational perspective itself, from the technological perspective, and from the perspective of the educational institution itself. In the end, a set of key success factors was identified, which can support the implementation of actions for digital transformation in other educational institutions. Although the researchers suspended the collection for the meta-analysis at the beginning of the pandemic, they included a qualitative analysis of its impact on educational institutions. In this way, they were able to carry out a study that connects the previous reality to the reality of the period of social isolation and remote teaching. As a result, they highlight the need for the educational model to support the digital transformation. Besides that, it is important to encourage all actors involved in this process to make them consider themselves as part of a learning community.

The article presents an interesting approach by working on the investigation in the pre and pandemic period. Although the research results for these periods cannot be compared, the authors were able to identify the importance of structuring and planning for digital transformation as a central element in the development of higher education. In addition, although the investigation is not limited to the context of the two Latin American countries, the authors manage, throughout the text, to present elements that allow a little more specific understanding of which aspects are characteristic of the institutions in the region.

Castro-Bedriñana, Chirinos-Peirnado, and Castro-Chirinos (2022) is the first study that effectively addresses the impacts of the COVID-19 pandemic on education. The authors identified that before the pandemic, digital transformation efforts were null or incipient in most universities in the interior of Peru. However, the pandemic caused emergency measures aimed at the adoption of remote teaching to be adopted. A survey with students from the Central Andes of Peru was carried out and a sample of 1029 responses from students from 38 different courses was obtained. The study comprised the analysis of 28 criteria related to didactic, technological, and psycho-affective aspects. The results revealed that 30% of the students were dissatisfied especially with the teaching materials, feedback process, e-learning support, development of practical and laboratory activities, and teaching performance. The same percentage was identified with students frustrated with virtual classes. As a result, the authors highlight the importance that, after the pandemic, teaching does not revert to the previous face-to-face model. According to them, universities should continue investing in virtual models or blended education as an alternative to take advantage of the benefits of information and communication technologies in the process of improving the quality of higher education.

The next two publications were completely developed after the beginning of the lockdowns caused by the COVID-19 pandemic. Furlan, Pringles, Palma, Escriva, and Lorenzo (2002) presented the online experience of a university located in Argentina. The authors described the methodologies and techniques used by the faculty to switch a class to an online environment as a flipped classroom, the design of activities to promote transversal skills, and the modification of evaluation forms. As a result, the students showed a strong commitment to the proposal, an important responsibility in group activities, and a very good connection with virtual tools. According to the authors, the presented results indicate the potential benefits of the adoption of hybrid approaches after the pandemic.

Nogueira and Paniago (2022) presented a case study of a university located in Brazil during the pandemic period. The authors identified that the concept of blended learning was not well known by the institutional actors and that there was a relative incomprehension of how to support active learning in various spaces in an integrated manner. According to the research findings, the pandemic can be

considered a driving force for the expansion of blended courses, but the university did not establish an approach to the valorization and development of the faculty.

The results presented by Nogueira and Paniago (2022) can be analyzed by Castro-Bedriñana, Chirinos-Peirnado, and Castro-Chirinos (2022) to highlight that the potential lack of faculty development could be a drive for students' frustration. Besides the need to implement an emergency remote education process, it remained for more than a year and the need to develop faculty was crucial not just to start the process, but for its continuity and the potential exploration of blended educational methods after the lockdowns.

The importance of this study can be understood from two aspects. The first is that this is the first study in the sample that considered the context of the COVID-19 pandemic. In this sense, it reveals the weaknesses in terms of technological resources, as well as the preparation of teachers and institutions to offer remote teaching. These weaknesses, found in Peru, reveal specific aspects of that country, but which could be better investigated in the context of Latin America. As highlighted by Muñoz *et al.* (2021), digital transformation was not presented as a relevant topic in studies on education in the region. Most likely, the lack of academic interest reveals the lack of interest of the institutions themselves in making efforts to lead this transformation process. The second aspect is that the pandemic, by accelerating this process, at the same time as showing the weaknesses and limitations related to the use of technology, caused the process to advance at an accelerated pace. This advance, according to Castro-Bedriñana, Chirinos-Peirnado, and Castro-Chirinos (2022), should not be abandoned, as the new post-pandemic educational context will demand greater efforts from educational institutions so that the virtual or blended approach remains as current models of education in higher education.

## FINAL CONSIDERATIONS

This article aimed to investigate how far we had advanced in Latin America in terms of Digital Transformation and Blended Education based on the analysis of publications in the Scopus database. Based on a systematic literature review we identified that little is known about digital transformation and blended education in the region. Only seven manuscripts were developed by researchers from institutions located in Latin America and no other manuscript considered Latin America as part of the empirical context.

Besides the limited number of papers, we were able to identify that the region suffered during the COVID-19 pandemic to implement digital educational systems to maintain education besides the required social distance period. Digital transformation was not a relevant topic for education before the pandemic and the need to implement technology very fast pushed this process. The goal at this moment may be linked with the need to keep the knowledge developed during this period to support the continuity of the digital transformation process.

We understand that our research, limited to the Scopus database, presents restrictions resulting from this choice. The same was done because we understand that our article begins to outline an investigation on the topic, being a starting point for new studies to be developed. As we opted for a quantitative and qualitative analysis of publications, we consider that this delimitation was necessary. However, we highlight that research in other databases is essential to advance knowledge in the area.

While reading the article, an interest emerges in understanding how the teaching process in Latin America has been reorganized based on the need to use technological tools resulting from emergency remote teaching, as well as the advancement that these technologies provide in education, especially in blended education. We understand that our study, due to its methodological limitations, does not allow this type of analysis. It was not our objective to analyze this process, and we are unable, at the

end of the study, to discuss the object of study in this way. However, we believe that this limitation of our research proves to be an opportunity for future study that could build on the results presented here.

Another important point to be highlighted in the final considerations is that the results obtained do not allow us to draw a comparison between the use of blended education before and after the COVID-19 pandemic and the need for remote teaching. We understand that we have two limitations here. The first is that our methodological decisions limited the search for articles about the period. The use of just one database is a restriction and we believe that expanding research into other databases could help to understand the scenario in a broader perspective. Another limitation is that there are still few studies on the period of isolation that occurred during the pandemic and even fewer on the resumption of in-person, or partially in-person, classes. We are referring to a very recent historical period and we believe that the growth in publications identified in the research is a trend that will be maintained in the coming years when we will then be able to draw this comparative panorama with greater accuracy.

A point to be discussed at the end of this article is whether there really is a digital transformation effort in education or if we are just in a digitalization process. This discussion is very important because it was not possible to identify effective efforts aimed at transforming the generation of value through digital technologies. It was observed that digital technologies were adopted as an alternative to traditional methods, but without a reflection that allowed a profound digital transformation. We highlight the need for a critical view of this process. The identified articles generally present an optimistic view of the use of technology. However, external factors arising from the reality of Latin American countries, as well as specific aspects of educational environments, may present themselves as restrictions to the digital transformation process with the adoption of blended education methods. Furthermore, the technologies used and their limitations also represent critical points that require greater attention so that the discussion on the topic can be deepened.

Given the limitations that we found in the content of the article sample, we believe that it is essential to conduct future empirical studies that investigate so many general aspects of the digital transformation process through blended education, as well as the investigation of individual experiences that allow the deepening through reports and their analysis. Only by obtaining more empirical information will it be possible to understand not only advances in the area but also how it is occurring, its drivers, and barriers.

Despite these limitations in the studies, it is necessary to highlight the potential of blended education as an alternative to expand access to education in Latin America, as well as to improve the quality of education. Distant and less developed regions often find it difficult to offer some forms of education. Still, access to qualified teachers is often restricted in these regions. The adoption of blended education can help to overcome these difficulties. Its tools allow knowledge to be shared with a larger number of students, even in different regions. Thus, technology can collaborate with regional development through increased access to education and more qualified specialists.

The few articles focusing on Latin American countries were not sufficient to give us the opportunity to generalize any findings. But they gave us the opportunity to identify the need for more studies related to this subject. Regarding this, it is important not to focus only on higher education, but to develop studies related to the other educational levels.

Studies focusing on how the environment can influence educational transformation appeared as another research opportunity. The two studies focused on Peruvian institutions revealed two opposite scenarios. While in one, there are no restrictions based on the environment, the other one highlighted that the lack of previous expertise resulted in a low satisfaction level.

Another important point in our view that is not addressed in the sample analyzed is the impact of these experiments that characterize digital transformation through blended learning in the formulation of public educational policies. As technology and digital transformation are inseparable

elements of today's society, we understand that it is essential that the experiences taking place in the region can support the formulation of public educational policies that allow for the best use of blended education, respecting both social and technological limitations, and that allows barriers to be overcome through support instruments. These instruments need to consider aspects that we had research limitations in our approach due to the low sample size. The expansion of empirical studies will allow for an increase in the knowledge base on the topic that supports the discussion on educational policies, their formulation, and implementation.

Despite the growth in the number of publications on blended education and digital transformation in recent years, we understand that in addition to the COVID-19 pandemic and the technological advances made available recently, other factors may be influencing the increase in publications on the topic. Our article does not allow these motivations to be ignored, but it raises an opportunity to study the motivations for increasing studies on this topic.

Blended educational methods seem to be an opportunistic approach to promoting TD in education after the COVID-19 pandemic. As it can mix benefits from face-to-face and virtual methods, it can be designed to be implemented in a way to support the limitations of both approaches. But, to do so, more knowledge is required, and it opens a research opportunity for future studies.

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## DECLARATION OF CONFLICTING INTERESTS

The authors declare that there is no conflict of interest.

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