Virtual University and Educational Transformation in the Context of the Pandemic

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The COVID-19 pandemic resulted in an abrupt transformation to virtual education, which highlighted the numerous shortcomings in the organization, methodology, strategies, and technology used. The article's objective was to deepen knowledge on the impact of the virtual university on educational transformation during the COVID-19 pandemic. The methodology used was a literature review. Different searches of reliable and recently published sources were carried out in the Scopus database. The following four points were prioritized: global context, ICT, e-learning, and the emotional aspect of students and teachers. The results indicate that the adaptation to an online education exposed significant gaps in the sector, affecting both students and teachers, and resulting in a lack of motivation in their academic work. It is concluded that virtual education is in total development mode. Therefore, institutions must improve their entire organization to adapt to the new form of teaching and learning.

Keywords: digital adaptation, COVID- 19, higher education, distance learning, ICT

INTRODUCTION

Virtual education is popular today, but few realize that its beginning dates back to years before the global health emergency caused by the SARS-CoV-2 virus (COVID-19) (Niño et al., 2021). This was the

result of a need for flexibility in programs and the face-to-face methodology in order to diversify educational channels and combat the problems of desertion and exclusion that are frequently seen (Amaya et al., 2021). In recent decades, numerous works published by experts clearly show that university education must embrace educational models that increase participation and practical school activities (Imbernon & Medina, 2008; Michavila, 2009; Ministerio de Educación y Ciencia, 2006, as cited in Romero et al., 2020).

In this line, it is notable that the main factors that challenge the implementation of virtual classrooms in educational institutions have been analyzed (Martínez & Jiménez, 2020). Online courses are increasingly in demand, which encourages their realization (Song et al., 2019). Therefore, instructors and students have been faced with adopting technologies that present new challenges for both (Wut & Xu, 2021).

In the case of universities, it is crucial to implement a digital transformation of the institutional model in order to transcend time and not disappear from the scene; moreover, universities must evolve comprehensively (F. García, 2021; Veletsianos et al., 2021).

There have been efforts to promote virtuality in many Latin American countries; however, due to the lack of sustained government and educational policies, they remain unfinished. Despite this, other countries provided technical training to teachers. For example, the Ecuadorian Ministry of Education launched a self-study course for teachers, called "My Online Classroom" (Navarro et al., 2021).

On the contrary, European and Asian universities have made a more significant impact in this transition as they envisaged virtual university education to be a futuristic opportunity that would soon become the new reality (Fatani, 2020). Among them, we can highlight the University of Torino (Italy) and the Autonomous University of Barcelona (Spain) for imparting knowledge remotely. Because the presence of education in the new virtual spaces was necessary to improve research and use of Information and Communication Technologies (ICTs) in classes (Tejedor et al., 2020). Similarly, the University of Milan (Italy) had already implemented different strategies before online courses. They trained their teachers by providing them with other technological tools and conferences to properly use educational platforms (Agasisti & Soncin, 2021). Likewise, a distance modality had already been implemented in China, which involved 16.72% of all graduates (Li & Wang, 2021).

Although online teaching has been promoted for many years, the COVID-19 pandemic has encouraged it on a large scale (Wu, 2021). Unfortunately, the educational system was not exempt from the damage of the pandemic, which caused an abrupt change in the teaching perspective. Therefore, it is impossible not to see education transformation at all levels after educational centers migrated to digitalization (Amaya et al., 2021; VanLeeuwen et al., 2020). Distance education has made us perceive a new vision of the use of technology. Different applications and platforms are needed to make the teaching process more effective and viable, and thus more relevant (Diaz et al., 2021).

Likewise, many institutions feel the need to develop a digital infrastructure, which in some cases had not been foreseen. However, this restructuring has introduced various changes in the educational programs (S. García & Santana, 2021). As expected, the results were not very encouraging as the quality of teaching, understanding, and participation of students was significantly compromised due to the changes being made in the shortest possible time; many institutions were not prepared nor trained for the transition (Amaya et al., 2021; Niño et al., 2021).

Consequently, it was required to mobilize digital and pedagogical skills, and institutional and non-institutional resources to provide good teaching (Damşa et al., 2021). Additionally, many private universities were severely affected financially due to demands for tuition reimbursement because students could not make use of the facilities, services, and activities normally conducted in a face-to-face format, were carried out in different educational centers (Ko et al., 2021). For this reason, the usability and accessibility of educational data acquired more incredible notoriety in the current context (Fonseca et al., 2021).

On the other hand, over time, there have been certain deficiencies in virtual classes involving ICT use. Among these are the lack of attention of the students, insufficient training for its use, lack of interaction with the student on digital platforms, and technological knowledge gaps, especially in Latin America (Song et al., 2019). The current situation made these deficiencies visible and generated different opinions in universities regarding online education as many gaps were exposed that separated students from a better

education (Sánchez et al., 2020). Hence, many university students classify an online class as anti-humanistic because it is not socialized, it is learned independently, and it does not help develop critical thinking (Eringfeld, 2021).

Adapting to virtual education is more complex in Latin America due to the indices of unequal competitiveness in digital education. For example, some countries have more than 90% ICT equipment in their educational institutions, others between 82% and 61%; however, in comparison, it is evidently between 11% and 6% (Information System of Educational Trends in Latin America [SITEAL], 2014, cited in Bullón, 2021). In this regard, the results of Tejedor et al. (2020) demonstrated that during the first pandemic quarantine in Spain and Ecuador; university professors had a lack of technological resources for using ICT. Likewise, another result indicated how perception regarding the availability of ICT, which includes access and the correct type of technology, depends on the user's need and the specific moment of use (Navarro et al., 2021).

In addition, another critical point of ICT is collaborative work. The types of digital tools used in the university environment can facilitate student cooperative learning more because they focus on the use of university training platforms; precisely, one of them is the participation forum that favors learning joint cooperation (E. Fernández, 2020, p. 89).

Today's world is distinguished by a complex network of technical and social systems that comprise cyberspace and must be accepted as mechanisms of social organization (Guerrero, 2009). Such cyberspace is embedded in our general culture and, at the same time, reshapes it. For example, with the pandemic, many people acquire knowledge through online learning approaches (Yu, 2021). That is why technological innovations accelerated in growth after the need to migrate to digitalization in the education sector as it was considered an opportunity to address social problems (Navarro et al., 2021).

In this sense, some teachers do not seek to be trained in new technologies and this attitude significantly affects adaptation in the virtual educational model (Amaya et al., 2021; Esteve et al., 2020). For example, according to Mendoza et al. (2019), mathematics professors in Colombian universities tend to resort to the traditional teaching method, such as using blackboards to solve exercises; however, he considers that such didactics must be transformed to the virtual modality. Similarly, the performance of the teaching staff in the public university of Spain has shown shortcomings and difficulties in terms of the adaptation process with tele-education due to factors such as the abrupt change to transform the teaching process. This experience should guide how to face new courses in a multimodal modality by combining face-to-face teaching with online teaching in virtual learning environments (M. Fernández et al., 2021).

Given the limitations imposed, various training approaches have been developed. A clear example is a digital pedagogy characterized by strengthening skills in technological entrepreneurship. Its success requires students' commitment and dynamic, offering personalized comments from teachers, discussion forums, tests with immediate feedback, and classes with reading materials (Torres et al., 2021). In addition, pedagogical success is also due to the educational support that teachers receive from both official organizations (universities) and non-formal entities (people inside and outside their university) to address the tasks of learning and teaching development (P. Gómez et al., 2021).

We must emphasize that the pandemic limited the educational system and the learning experience related to the ability to access research materials. According to the study by Hebebci et al. (2020, as cited in Ratib & Ali, 2021) the results determined that students have difficulty doing group projects due to the lack of socialization on campus as declared by 42.9% of those surveyed. Likewise, another study found that science and engineering courses had the lowest performance in distance classes due to the scarcity of methods that replace laboratories and experiments (Li & Wang, 2021).

E-learning, which involves teaching and learning through the Internet, gained relevance mainly among students as it aims to integrate education with the use of technologies (F. García, 2021). Although e-learning has a positive impact on university students, many urgently want a return to face-to-face teaching and university life mainly because of the social benefits this entails (Bork et al., 2021). Conversely, studies by Ejdysy Kozłowska (2021) conclude that academic teachers do not share the positive results of online learning. It should also be considered that e-learning does not have the same impact at higher levels as in primary education (Edelhauser & Lupu, 2021).

Digital transition has been achieved through virtual learning platforms and learning management system (LMS) schemes. In this way, the Universidad del Valle de México (UVM) chose to use the Teams platform to continue its educational process. Among the factors that influenced the level of satisfaction of remote emergency teaching is the lack of changes in the initial planning, the pleasant disposition on the part of the teachers, and the students' joy due to the duration of the sessions (Rodriguez et al., 2020).

Similarly, the model on Technology (TK), Pedagogy (PK), and Content (CK), better known by its acronym (TPACK), identifies the types of knowledge that a teacher must master to integrate ICT effectively in virtual teaching. In addition, it combines theoretical knowledge for students so that it facilitates the understanding and evaluation of their learning (Amaya et al., 2021; F. García, 2021). E-content is defined as a group of course readings, multimedia links, simulations, elaborate explanations, case studies, course assignments, and discussion forums that have as its objective qualitative learning and customer satisfaction among students (Thurmond & Wambach, 2004, cited in Kumar et al., 2021).

In different universities around the world, tele-training platforms (PTM) are implemented that facilitate the use of digital tools for teachers. For example, the universities of Andalusia (Spain) have platforms that go hand-in-hand with their economic goals and their Governing Board holds a contract with higher education institutions that stipulates the use of PTM for teaching (Marín et al., 2021).

Similarly, the Social Massive Open Online Course (MOOCs) and Transfer Massive Open Online Course (tMOOC) are post-digital online learning models that are constantly evolving as holistic, innovative, collaborative, interactive, and social methods (Hueso et al., 2021). The Flipped Classroom is another educational methodology for distance learning; in the Faculty of Educational Sciences of the University of Malaga, teachers adopted Flipped Classroom as an effective method of sustainable education during the pandemic (Collado et al., 2021). In Peru, the Professional School of Systems Engineering of the National University of San Agustín de Arequipa demonstrated a practical approach to education based on sensory environments through the use of virtual classrooms (Aedo et al., 2020).

The emotional aspect has also been significant during the current crisis, especially for teachers as they are the ones who must now integrate the content of their pedagogy and technology when teaching their classes (Penado et al., 2021). The problem with the COVID-19 pandemic is that teachers at all levels are more likely to feel stress or experience emotional distress due to increased work hours depending on work experience, age, or country (Navarro et al., 2021; Niño et al., 2021).

Teachers also showed demotivation due to the new way of teaching; many could not be given the necessary tools to transmit good education online (F. García et al., 2020). However, in this aspect, the most substantial disadvantage was the lack of relational and reflective exchanges with the students "in the classroom," i.e., teaching does not imply only transmitting knowledge but also positive emotions, relationships, and memories (Casacchia et al., 2021).

Regarding the mental health of university students, confinement has caused continuous and harmful effects, such as more intense and lasting emotions (Huicho, 2020, as cited in Cuevas et al., 2021). Consequently, more than half of the student population has lost the motivation to continue studying because the universities present a poor quality of teaching (Mukhopadhyay et al., 2020). Likewise, student satisfaction decreased considerably in the last semester of 2020 because said satisfaction depends on the structure of the course, the feedback, interaction, and facilitation of learning (Rahman et al., 2021).

Some students handled the stress of the pandemic with resilience while others were restless and fearful. This caused low motivation among some students and lower participation in their online learning. The importance of the emotional state increased when the situation began to affect student learning and its adverse effects multiplied when it was associated with fear of failure, especially for those who suffered economic losses due to lack of resources (Munir et al., 2021).

After the limitations and problems arising from the above, this research aims to deepen the knowledge found on the impact of the virtual university on educational transformation during the COVID-19 pandemic.

METHODS

The present work is a bibliographic review that aims to identify, analyze, synthesize, and integrate the bibliography of the subject (E. Gómez et al., 2014). According to the Institute of Health Sciences (2012) a bibliographic review is divided into stages. The first stage defines the problem and the objective to clarify what the research questions. Next, specific sources of information are identified to start the search with a defined strategy. Finally, data found based on search criteria and selected documents of interest are analyzed.

As a source of information, the Scopus database was mainly used due to its high bibliographic impact and the reliability of all the documents. Boolean operators were used in the search strategy for data collection, especially "AND" and "OR" to delimit articles referring to the "virtual university," "E-learning university," "virtual university," "virtual learning," "digital transformation," and "virtual education." In the first instance, a search was done with the following combination ("higher education" OR "virtual education" OR "E-learning" OR "distance education") AND ("educational transformation" OR "virtual transformation"), obtaining 1,001 results.

Subsequently, the data were further reduced by the following exclusion criteria: open access articles, from 2017 onwards, from the area of social sciences in English and Spanish, and limited to 137 pieces. Subsequently, the papers were chosen based on the level of impact while prioritizing the Q1 and Q2 periods. At the end of this exclusion and selection process, 56 articles remained.

TABLE 1
FILTERING OF ARTICLES ACCORDING TO THE EXCLUSION CRITERIA IN SCOPUS

Type	Search Equation	Scopus
General	("higher education" OR "virtual education" OR "E-learning" OR "distance education") AND ("educational transformation" OR "virtual transformation")	1,001
Specific	("higher education" OR "virtual education" OR "E-learning" OR "distance education") AND ("educational transformation" OR "virtual transformation") AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO (PUBYEAR, 2019) OR LIMIT-TO (PUBYEAR, 2018) OR LIMIT-TO (PUBYEAR, 2017)) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English") OR LIMIT-TO (LANGUAGE, "Spanish")	336
Specific	("higher education" OR "virtual education" OR "E-learning" OR "distance education") AND ("educational transformation" OR "virtual transformation") AND (LIMIT-TO (PUBYEAR, 2021) OR LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO (PUBYEAR, 2019) OR LIMIT-TO (PUBYEAR, 2018) OR (LIMIT-TO (PUBYEAR, 2017)) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English") OR LIMIT-TO (LANGUAGE, "Spanish")) AND (LIMIT-TO (SUBJAREA, "SOCI")) AND (LIMIT-TO (OA, "all"))	137

Source: self-made.

TABLE 2
EXCLUSION CRITERIA

Variable	Inclusion Criteria
Year of publication	Articles from the year 2017 onwards
Access to publications	Open access articles are considered

Document type	All published articles are considered
post area	References from the area of social sciences are considered
Languages	Limited to articles in English or Spanish
Most Cited Articles	Must have at least three citations

Source: self-made.

The references obtained were divided among the team members to read and accept the information of said articles: objectives, population and sample, methodology, results, conclusions, and critical ideas. All this is to delve into the subject and understand the different aspects. To obtain all this information, techniques such as underlining, summarizing, and paraphrasing had to be applied when reading the content, where it remained. As a result, the identification of articles from different countries, for the most part, presents virtual education in the context of the COVID-19 pandemic.

Likewise, the articles mentioned had to be exported from the Scopus database through the Mendeley Chrome extension to facilitate citations and references in APA seventh edition format, using the Mendeley plugin for Microsoft Word.

RESULTS AND DISCUSSION

The results show that the technological tools applied in education before the arrival of COVID-19 had many deficiencies and that these have limited the correct management of the decisions involved in the digital environment of the new teaching modality. For this reason, the pandemic has shown that education goes hand-in-hand with the use of technology. Hence, universities must progressively improve their educational platforms and implement them in adverse situations. As F. García (2021) indicates, these technologies bring with them new challenges; at the same time, however, they also bring essential and necessary innovations for higher education. Adding to this, we agree with the ideas of Li and Wang (2021) that good performance in the digital environment was perceived in many cases. In this way, students will want to continue with virtual platforms. This study is relevant because it expands to new knowledge and methodologies that educational science applies after the current context, demonstrating that education is transformed and adapted according to the needs of the members of these institutions.

In contrast, León determines that manual training requires face-to-face classes due to their poor performance in virtuality. Consequently, university teaching methodologies must adopt new strategies that improve the quality of online learning and become more dynamic with students (Bork et al., 2021). Likewise, it is suggested to review the study by Vidal et al. (2021), which delves into the abrupt impact of COVID-19 on higher education.

Regarding digital transformation, it can be highlighted that the usability and accessibility of virtual tools and platforms are even more crucial in the context of quarantine. Distance education has made universities perceive the need to use different applications and media to make the teaching process more effective and viable. As mentioned by Sage et al. (2021), during confinement many education centers quickly ventured into small classes. Students and teachers faced new challenges and experiences that they can benefit from thanks to tools. Technologies applied in digital teaching. For this reason, Kumar et al. (2021) highlight that the quality of e- learning positively influences student satisfaction. Among the most outstanding contributions regarding e- learning is that of Diaz et al. (2021). These authors mention that e-learning has made universities develop a new vision of using technology to motivate students to continue with their learning. On the other hand, it is suggested to review the study by Fardoun et al. (2020) to understand better the difficulties faced in implementing e-learning in Ibero–America.

However, due to the massive change from face-to-face to remote education, many institutions were unprepared or untrained for this transition. During the first COVID-19 lockdown, teachers faced

complications in their regular teaching. They had to position themselves and act in a highly contingent situation due to the lack of attention toward them and the students. The minimal handling of virtual tools and lack of training of teachers regarding changes in education made adaptation difficult and reduced the quality of pedagogy. On the other hand, teachers faced complications when teaching their classes due to the lack of attention, which puts students at risk. Regarding the difficulties of virtual teaching, Khan et al. (2020) mention that some challenges related to changes in teaching that included the development of online tests, reliability and validity tools, and detecting plagiarism in evaluations. In addition, the teachers surveyed mentioned that the tests carried out in software, web security, and technical support will be challenging. Faced with these difficulties, virtual tools play a significant role in distance education.

Under this idea lies the need for optimization and integration in educational centers, mainly due to the pandemic. Damşa et al. (2021) mention that technologies can also induce the appearance or development of new virtual teaching practices and programs after the COVID-19 pandemic has passed. In the same way, Marín et al. (2021) mention that in different universities around the world, tele-training platforms (PTM) are being applied in teaching that facilitate the use of digital tools by teachers. For this reason, it is essential that the new proposals for LMS platforms adjust to the needs of higher education institutions. Hence, it is suggested to review the study by Palacios et al. (2016) to delve into the issue of educational platforms.

The authors agree that these models are integrated into post-digital learning regarding online training models. In addition, they imply an autonomous and innovative understanding of knowledge. Therefore, the importance of having a practical methodology for sustainable distance education is reflected. Hamdan et al. (2021) conclude that learning and teaching will not develop in the same way after COVID-19; hence, educational institutes should adopt online policies to support ICT learning and blended learning. The author's contribution is evident in the fact that students perceive e-learning positively to integrate education with technology. In-depth about ICTs, Navarro et al. (2021) conclude that they are of great importance for the benefit of the methodology of university teachers by contrasting their critical skills after the impact of COVID-19. Therefore, it is evident that ICTs use in higher education is currently essential and there must be correct advice given to teachers. It is suggested to review the article, "Higher education during the COVID-19 health contingency: use of ICT as a learning tool" by Sapién et al. (2020) for techniques in education virtuality that improve and control the use of ICTs.

From an emotional aspect, it is evident that the abrupt change to teaching style brought negative consequences for teachers. They experienced increased stress and job demotivation due to significantly more hours worked to gain the necessary technical knowledge. In the same way, students also revealed how fear, stress, and anxiety among other feelings led to the loss of motivation to continue studying. Likewise, Alibudbud (2021) reports a high prevalence of depression, anxiety, and obsessive–compulsive disorder (OCD) symptoms. Furthermore, many students exhibited suicidal ideation and attempts during the COVID-19 outbreak in China. Similarly, Ratib and Ali (2021) mention that student learning was made worse after moving to a virtual education system. To reinforce this idea, Munir et al. (2021) believe that social presence is critical for student learning achievement and satisfaction. Therefore, it is suggested to review the study by Marelli et al. (2021) where the various factors that led to the emotional exhaustion of students and teachers are addressed.

Likewise, Tejedor et al. (2020) consider that students present with discomfort and increased stress due to high workload and nonconformity when taking their classes online and, again, the majority of students seem to agree. In this line, Penado et al. (2021) highlight that teachers' disproportionate increase in stress, anxiety, and fatigue is due to the enormous burden they carry when teaching virtually with technological devices. On the other hand, Yong et al. (2017) mention that online education favors student learning and communication with their peers and teachers as they would be in safe interaction spaces. Similarly, Rahman et al. (2021) suggest that virtual learning has improved student satisfaction and performance.

CONCLUSIONS

The present investigation identifies four critical points that contribute to our knowledge on the impact of the virtual university on educational transformation during the COVID-19 pandemic.

It follows that the measures taken in applying a virtual university educational process in Latin America and the rest of the world before the pandemic have been uneven. In Latin America, most countries had poor preparation for virtual teaching. In Europe and Asia, its application has been helpful and progressive, which has made it possible to mitigate the effects of confinement by migrating to digital spaces as the only means of education. In addition, it is concluded that these abrupt changes to the teaching model have allowed it to gradually adapt to the use of new technologies useful for the continuity of online learning.

On the other hand, it is concluded that ICT is essential in forming new methodologies in virtual education as teachers and students consider it an efficient alternative. In addition, in the wake of COVID-19, universities have quickly adopted this teaching tool with satisfactory results. For this reason, ICT play a fundamental role in education, including monetary investment by the state and private sectors as it is one of the essential bets for the future of education.

In addition, e-learning has provided a new avenue of education. Although it has different repercussions at each educational level, it has gained significant relevance, especially during health crises. Moreover, innovative teaching with a sound methodology can bring good results. However, it should be noted that this method of teaching and learning is not positive and beneficial for all students. This means that a large proportion of students and teachers prefer face-to-face education over a virtual one due to the difficulties of isolation that arise when carrying out this educational option.

Finally, the emotional well-being of students and teachers has been negatively affected by virtual classes. Sadly, universities have been remiss to resolve this as little importance is given to the mental and emotional health of their teachers and students. In this line, different evaluations must be carried out to determine the emotional state of each member of the university community. Therefore, research on various factors that affect the emotional exhaustion of students and teachers should be encouraged.

In short, even though the world is in a stage of digitalization, the pandemic has highlighted the deficiencies of online learning globally, especially in Latin America. The fundamental role of ICTs and e-learning in implementing new methodologies in teaching can be confirmed: however, it is crucial to consider the mental health of students and teachers. For this, universities must carry out activities and strategies to combat emotional exhaustion.

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