

Virtual Education and Learning Ecosystems: Contributions from New Information and Communication Technologies

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Abstract

This article is the product of the collaborative work between several university professors from the Corpas Sana, Pedagogy-Science-Spirituality and Cibeles research groups, from the Juan N. Corpas University Foundation, Santo Tomás University and Catholic University of Colombia, who have been investigating the connections established between virtual education, new communication and information technologies and their contributions from learning ecosystems and in the context of the learning ecosystems, particularly from the challenges that Artificial Intelligence demands. The methodology was based on systemic documentary analysis and, in particular, specialized texts on epistemological and theoretical references of the object of study, which were integrated in a heuristic way; The conclusions and contributions are in line with vindicating the role of teachers, as well as the good use and exploitation of ICTs and A.I. in cognitive and metacognitive processes inside and outside the classroom.

Keywords: *Virtual Education, Artificial Intelligence, Information and Communication Technologies, Learning Ecosystems.*

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Introduction

The 21st century has been characterized by the ease with which information can be accessed, leading mainly higher education institutions to restructure teaching modalities, thus moving from face-to-face training to a distance modality and from there to virtual training, the latter having a particularity in which learning takes place in an indeterminate geographical location. The Internet "expands" learning environments, but at the same time it becomes a complement to traditional learning locations such as schools, libraries, and other types of educational institutions.

On the other hand, *the Horizon report (2022)*, mentions the importance of recognising higher education as a social practice and raises three transcendental propensities in higher education and in general, worldwide: *Skills-Based Learning, Remote Work and Hybrid and Online Learning*

García (2019) mentions how even the uses and customs of postmodern man are permeated in a strict way by cutting-edge technologies in such a way that human beings are summoned not to dispense with these technologies in a large part of our tasks. In the case of Artificial Intelligence (AI), UNESCO (2023) has prepared a document that aims to guide teachers and educational managers to make good use of it, especially from the formulation of correct policies and good pedagogical practices in educational centers from initial training to higher education. Also in 2019, a document was published entitled: "Artificial Intelligence and Education: Guidance for Policy-makers", which helps to have a more objective view of the challenges and challenges of A.I. in the field of education, as well as its derivations in terms of training in special, generic and basic skills, which are necessary in the era of ICTs especially mediated by A.I.

On the other hand, Cabero-Almenara et. Al (2021), alludes to how in the virtual modality, resources for teaching-learning processes are available so that both teachers and students, regardless of location and why not point it out, time, can access them without having to travel, thus maximizing time depending on the training, either by designing and organizing the contents in the virtual classroom or accessing it to account for the programmed activities.

International and National Context

International context: currently at a global level, an entire educational movement has been generated that, in addition to the phenomenon of globalization and planetization of the earth, aims to consolidate a culture of learning based on the virtual modality, this requires not only processes and developments at the national level, but also articulation with scenarios in the international arena. Clearly, these are supported and enabled by the use of digital technologies intervened by the interactive and multimedia design of the different contents. Therefore, digital environments that meet high quality standards can be used to the fullest by teachers and students in a holistic way as long as it is more articulated for each context and in harmony with international discourse (Gómez, 2020).

Some international events in Latin America are a clear example of the importance of implementing the culture of the use of virtuality in the field of education, an example of which are: First International Congress on Education with Information and Communication Technologies (Chile, April 2013), Ibero-American Congress on Science, Technology, Innovation and Education (Buenos Aires, 2014), X Virtual International Congress on Learning and Knowledge Technologies (Miami, 2022). 4th International Congress on Online Education (CIEO, 2023), held by the Gabriela Mistral University of Santiago de Chile. Of course, in many of these events, lines of research are emerging that

direct the destinies of virtual education and the correct use of information and communication technologies in our Latin American continent. Among the main challenges posed to virtual education in these events, particularly with respect to Latin America, are: interactive learning, innovative spaces for learning, learning ecosystems and neuroeducation, mobile learning, connectivity-mediated learning methods, online learning assessment, the didactic and pedagogical resources of virtual learning.

On the other hand, Cantú-Martínez, P. (2022), mentions as possible challenges of virtual education in Latin America, overcoming the technological gap between our peoples and nations, which should lead us to look at how to achieve quality education with coverage and non-exclusion of the most vulnerable populations, as well as to democratize the correct use of information and communication technologies from initial education to higher education.

According to Del Arco et. Al. (2019), despite the above, there are thinkers and educators who still doubt that ICTs and A.I. itself are the appropriate devices to help integrate and facilitate learning at the various levels of education in Latin America. In this sense, the role of the educator plays a very important role, as a motivator, guide and facilitator of the teaching-learning processes mediated by ICTs, especially to safeguard critical thinking, reflection, analysis and creativity in the face of technologies that apparently "facilitate" educational processes, but poorly oriented would lead to facileness. conformism and lack of creativity.

Piña and Senior (2020), also point out that in our continent we must rethink how to create new educational platforms with solid foundations to face the new challenges and changes that are coming to Latin America in the near future, they give as an example the case of STEAM education (*Science Technology, Engineering, Arts and Mathematics*), with excellent results that have been applied in various educational institutions for the restructuring and alignment of the education system with new policies of this nature at the global level.

For ECLAC (2020) in its document "The opportunities of digitalization in Latin America in the face of Covid-19", our continent, since the global pandemic of 2020, has the great opportunity to position public policies in education at this juncture of global change in terms of public apps as well as sophisticated models that are supported by "disruptive" technologies such as 5G, the use of drones, as well as data analytics platforms, robots and A.I., in general, teleeducation, virtual and distance education, in such a way that by improving the telecommunications infrastructure and digital connectivity, we reach an exponential increase in connectivity in education, in such a way that all types of populations benefit, among them the most vulnerable and forgotten of our vast continental geography; This coverage, of course, while preserving high levels of quality in both public and private education.

- National context: As a relatively new culture of learning and teaching, particularly in Colombia, virtual education has made significant advances that strengthen the didactic advantages compared to other training methodologies; aspects such as the flexibility for the organization of variables such as location, times, duration, routes and contents, among others, motivate learning through attractive multimedia presentations, playful and dynamic, giving way to modernization in the practical field of education through the use of digital technologies. Likewise, it is worth remembering, as mentioned in a study by the Universidad Externado de Colombia (2022), that in the country since the 70s of the last century, unschooling was accommodated, as a fundamental element of the beginnings of the so-called "distance education", which contributed in its time to mark a milestone in the transformation of many of the structures of education until then conceived as only face-to-face to give It led to the implementation of the technologies of the time, also tending towards both administrative and academic decentralization in the various educational programs of the time.

In the same way, in the current Government Plan, the need is contemplated: "*Democratize the virtual space: produce in a network to connect with knowledge and global circuits*", as well as: "*the promotion of training and digital laboratories in the different regions of the country, for the generation of knowledge and learning based on experience*" (p. 20). In this way, learning based on experience mediated by the digital, the relationship between education, technologies and the productive sector, and the relationships between education, creation and production are horizons contemplated by the current government plan in the country, tending to the articulation of the needs and guidelines of education at the global level.

Likewise, reviewing the situation of both public and private education in Colombia, it can be observed that the possibilities are wide with respect to learning based on virtual interaction, since in addition to linking the student and the teacher with the use of documents, videos and virtual learning objects (OVAs), they are made available to them, Complementary communication options such as email, discussion forums, chat, social networking services, and real-time classes through platforms designed for this. Likewise, the evaluation processes are transformed and expanded in relation to the possibilities offered by the platforms in which the virtual classrooms are structured and invite the teacher to consolidate good habits for learning.

On the other hand, in recent studies carried out by several media outlets at the national level, it is evident that there is still a long way to go in Colombia, especially at the level of teacher training for the optimal use of virtual resources, some teachers limit themselves to teaching the traditional class, only this time without the help of the board and the marker, but with the use of tablets, computers and cell phones, which makes it impossible to take advantage of the capabilities obtained with the good use of virtual learning objects (VOs). Which have the educational purpose of concentrating pedagogical and learning activities, as well as evaluation systems, using tools contextualized to each educational center and of great technological news.

In the same way, many education centers of all training levels have begun to understand that technological tools in the field of education, as well as training for the use of virtuality, transform learning environments in terms of "location, being, availability, entering, participating", since actions as simple as raising your hand in a virtual class go from the natural to the digital. even reaching debates, forums, symposia, etc., where students and teachers have the opportunity to interact in real time from the various scenarios of the great geography of the country and the continent.

This is how virtual education at the level of Colombia can contribute to the promotion of analysis, reflection, the search and construction of solutions, articulated with the lines of research in the pedagogical field of each educational institution and that can act as a support device and academic impulse for teachers and students. being a good resource for curricular and academic design in each of the country's educational centers.

In summary, currently, the participation in virtual education of educational institutions at all levels, as well as the lifelong learning from ICTs, of students in all regions of the country, become social challenges but at the same time solutions that allow a large number of people to live. It is important to note that ICTs enable innovation in teaching and learning processes, allowing this document to cite as a reference Article 67 of the Political Constitution of Colombia of 1991, It defines education as a right of the person and has a social function with which access to knowledge is sought.

This implies that it is necessary to restructure guidelines for the access and use of virtual resources, both for teachers and students; Therefore, in order to develop these guidelines, an interdisciplinary approach must be adopted in training for virtual education, in which, in the first instance, an epistemological articulation is evidenced that allows the acquisition of the necessary knowledge for the design and creation of virtual environments, allowing a constant and dynamic evaluation, which leads the Master's

Degree in Virtual Education to be consolidated and updated along with the technological advances of the Moment.

Towards a change of mentality in the face of virtual education

As mentioned above, one of the characteristics of the 21st century is the stronger use of digital media to optimize the traditional understanding of teaching and learning, it is not a matter of incorporating concepts of face-to-face education into high-tech lines that account for virtual learning, that is, the pedagogical principles of the nineteenth century cannot be the norm that governs the formative routes for the present. However, the transition to virtual training must be done with such subtlety in such a way that it allows the incorporation of the methodology that accompanies the virtual education of the program, since the human being has been cultured in the need for face-to-face, face-to-face contact in most processes, however the image and graphics that were recorded on the classroom board, It loses its relevance in contrast to the animations, materials and videos that can be linked on virtual platforms, giving the student the possibility to repeat them as many times as required.

The digital change invites managers, teachers and students to think and reflect on the importance of knowledge and its transformation, not only in postulates of the past, but with the emergence of new areas of knowledge; Thus, it is considered necessary for both the teacher and the student to have not only knowledge of basic skills such as computer use, but also communication skills, curiosity and the willingness to learn about learning itself, thus strengthening critical thinking and creativity; Therefore, the teacher accompanies the development of the modules, guiding through the forum of the classroom itself, the institutional email assigned to him and the institutional email of each student and with the development of the meetings, whether synchronous or asynchronous, since it is a training that is often 100% virtual, it requires a special change of mentality.

Understand then *what and how to learn, especially in a virtual environment, without direct interaction between teacher and student, without contact with the printed book, without what the "real world" demands, the "being" in the educational institution;* This makes it possible to strengthen the missionary mandate of many institutions in terms of their social purpose of training the good citizen and the good professional and at the same time, to shape the digital change, modifying the environment, promoting social exchange and the good use of the rules of collaborative work, because in the midst of the accelerated changes of the 21st century, Continuous adaptation and development will make it possible to meet new training challenges.

The Role of the Teacher in Virtual Didactics

Despite all the technological advances, it should be noted that teachers continue to be a central point of reference for students in all methodologies, the virtual one is no stranger to this, since it requires professionals who are experts in education and with the appropriate technical knowledge to provide strategic online learning opportunities, with the ability to identify from the beginning support needs that teachers require. The teacher then has several fundamental tasks, one is the structuring of contents, activities and videos for the asynchronous connection of the students, another is the preparation of synchronous meetings and another fundamental is the timely feedback of the work delivered by the students and the possibility of discussing them and expanding concerns in spaces such as the forum.

The teacher must then learn to plan, implement and reflect in a didactic way on the learning processes in virtual environments, for example in synchronous meetings, classroom rules must be established from the beginning, such as raising the hand, opening or closing the microphone, the correct use of the video camera and fundamentally the use of images. Videos and data should be clear to all participants. The teacher will dedicate the first meetings to orient the students on the management of the virtual classroom and

the platform for synchronous meetings as well as the possibilities of this to form work groups and if necessary, will schedule particular meetings to guide those who had difficulties to connect in the scheduled times or although they participated they were not able to appropriate all the elements addressed.

Quality in Teaching and Learning

Just as the quality of the accompaniment and advice of teachers in virtual education must be ensured, the quality of the learning content must also be ensured, as well as the evaluation processes from the digital environment, which are aspects that cannot be left aside and in a high percentage this can be guaranteed to the extent that institutions and programs, carry out the corresponding filters for the linking of teachers with the required experience. However, the factor that becomes an imprecise variable is related to the necessary infrastructure and technical facilities, both in each educational institution and outside of it. Quality virtual learning from home can only work to the extent that certain conditions are in place in addition to the technological ones, such as a suitable workplace, and in this too the teacher plays a relevant role by guiding students in techniques for independent and organized learning.

Likewise, the teacher requires the collaboration and accompaniment of available specialists who timely support the management of problems that arise both at the level of the management of the platforms, with the use of software as well as hardware, and in the updating of equipment and platforms, without neglecting the technical verification of protocols and other processes within the platforms themselves. In this way, teachers can guarantee students a quality education, worrying more about implementing innovative learning methods in relation to the content that is included, the use for example of interactive graphics, OVAs. In traditional education, extracurricular activities such as visits to museums are usually scheduled, which facilitate the work of the teacher with the implementation of a more experiential process for the student. Currently, these types of visits are already possible virtually, including with 3D implementations, which constitutes a strengthening for virtual education and emerging from digital ecosystems for learning.

However, it is important that all actors who participate in education in virtual mode, whether as teachers, students, directors, administrative or technical support, understand that training through virtual meetings is different from that of a conventional classroom, so the design and presentation of the classroom must be varied, active and dynamic. that invites the participant to develop the proposed activities; For example, the texts that guide the work to be done must be clear, without embellishments, and the times defined for the development of the activities must be in accordance with the guidance of the students.

Discussion

As pointed out in the abstract of this article, the method used to work on the topics was that of systemic documentary analysis and especially of specialized texts already mentioned as epistemological and theoretical references of the object of study that were heuristically integrated into its main elements. This method facilitated the theoretical discussion in terms of posing the possible key questions and questions to elucidate the path of epistemological reflection that derives from the role of teachers, as well as the good use and exploitation of ICTs and A.I. in cognitive and metacognitive processes inside and outside the classroom.

The questions that arise to generate academic debate are the following:

- Does virtual education respond as a possible solution to the problems of formal and informal education in the context of lack of coverage, quality and equity in the various educational scenarios of the Latin American continent?

- What should be the degree of commitment of our local and national governments in terms of the deployment of digital platforms to address the educational gaps in our continent?
- How could coverage be balanced with quality in virtual education in such a way as to guarantee access with excellence to the various educational programs offered in our educational institutions?
- How could the Latin American education system migrate to a context where the distribution of knowledge is supported by an efficient flow of digital information?
- How could virtual education promote both digital and academic literacy of Latin American students at their various levels of education?
- . In the same way, can ICTs and virtual learning environments favor accessibility to the training programs offered in the various educational institutions in our continent?

Conclusions

Certainly, it is not an easy task to obtain definitive conclusions on a subject that in turn is in constant revision and epistemological resignification in various national and international scenarios, however, some are placed that are derived from the texts and bibliographic sources consulted, as well as from the pedagogical experience of the authors of this research work and that point to the imperative need to:

1. Take stock of how to balance coverage with quality in our education and training centers in Latin America, so that we address promptly and with academic and technological solvency the challenges that arise in education systems from initial to higher education (Gómez Arévalo, 2020).
2. Improve urgently in our Latin American countries by giving way to structural policies that allow the implementation of ICTs as well as the implementation of advanced digital solutions with the aim of optimizing the quality and coverage of education at all levels.
3. Accept the technological revolution that the 21st century is proposing in terms of assuming the new educational and technological trends that will allow us to respond to the serious problems of coverage and quality that continue to occur in our Latin American regions, especially in the most vulnerable and far from the big cities.
4. Make an effort to improve the training of both teachers and students in digital skills, this being an aspect of capital importance for the teaching-learning processes, where it is Christianized as an indispensable aspect for the proper functioning of educational and school scenarios in Latin America.
5. Extend the coverage and access of educational centers to telecommunications networks through adequate public policies and using updated regulations in technological terms to promote the use of high-capacity networks such as 4G Advanced and 5G with the development of IXP infrastructure, in such a way as to ensure and certify a better service with low internet connection costs for the entire student population, especially those furthest from the big Latin American cities.
6. Finally, it is concluded that information technologies must be at the service of teachers, as well as students and administrative staff, in such a way that they can reach all their benefits and scope in terms of training; This will also contribute to each of the agents involved in the teaching-learning processes, to be able to immerse themselves in the various uses of knowledge, as well as to be constantly updating skills and competencies of the benefits of virtual education, in order to generate motivation and interest in learning and the transformation of pedagogical practices both in the classroom and in the various educational scenarios in our country and in the future. the Latin American continent.

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