Use of ICT in the Teaching-Learning Process during the COVID-19 Emergency Lockdown: An Analysis of International Cases

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It can be stated that the worldwide emergency caused by COVID-19 has led the authorities of the educational centres to reflect on their practices. The world is being forced to change from a face-to-face mode of learning to e-learning. In e-learning, many processes are different, and therefore can be a great challenge, not only because the transition has been abrupt but also because there are teachers who do not have the basic digital skills required for this migration. An analysis was carried out based on categories that were created with the relevant and most repeated points in articles and other already published sources. These were taken into account with the use of ICT in the teaching-learning process during the emergency lockdown caused by the pandemic. The purpose of this research is to report on strategies and good international experiences that could be replicated in Ecuador. The Desk Research method was used to collect information.

Key words: *ICT, e-learning, Desk Research, COVID-19.*

Introduction

Humanity is currently facing one of the most important events of the last 70 years. This pandemic, whose effects are still incalculable, in a few months has created millions infections and hundreds of thousands of fatalities. From this scenario, a set of measures have been taken to decrease or mitigate the effect of the COVID-19 virus in the population. One of the most notable is the confinement of people in their homes, with strict permanence regimes. The development of educational processes at all levels has been affected by this measure.

The most encouraging projections forecast for a possible return to normality, in no less than eight months to a year, producing an economic, environmental and social impact that affects all countries (Yáñez, 2020). Educational processes at all levels of education have been affected, causing a reorientation regarding the strategy of transmitting knowledge to students, where the use of ICT has an essential role (Basilaia & Kvavadze, 2020;Moreno -Correa, 2020).

In this context, it is relevant to point out that Information and Communication Technologies (ICT), for more than four decades, have become a transforming agent of society and are becoming increasingly important. The importance of this technology is so prevalent that this era has been called the information society era. In turn, it can be said that technology has been broken into different spaces of knowledge, including learning and the generation of new spaces (Castells, 1999).

ICTs encompass a set of digital tools available both for information management and for the development of various forms of educational training Among the many advantages is the possibility of interacting dynamically and innovatively, allowing the carrying out of didactic activities that integrate the visual, novel, and interactive (García, Reyes, & Godínez, 2017;Hernández, Orrego, & Quiñones, 2018).

The incorporation of these ICT tools, without a doubt, has generated changes in the educational field. This has not only been noticed in the methodologies used in the teaching-learning process, but also in the possibilities of innovation and skill development for adaptation to the changes that educational institutions have had to undergo from the current pandemic (Moreno, Rodriguez, Gomez, Ramos, 2020). New technologies have greatly helped to fulfil substantive functions in higher education, under exceptional conditions arising from the impact of COVID-19, with its virtual applications greatly improving education reaching university students (Mendoza, Rodríguez & San Andrés, 2020).

The modality of *e-learning,* has been chosen in these difficult times of a pandemic and brings with it modifications in teaching-learning strategies, logically based on the use of ICT tools (Torrecillas, 2020). It also leads to educational innovations (Falco, 2017) and the search for information to find out what other national and international educational institutions have done in this new stage of education to offer a quality teaching process to students based on the construction of a new paradigm (Hernández et al., 2018).

For some authors such as Atiqah, Na, Kim, and Oh (2020), they have valued the ICT sectors and are critical in this time of change of where these ICTs can be introduced in different areas. Atiqah, Na, Kim, and Oh (2020) analyse the different specific skills of ICT, using the principles of the consistency analysis approach and identify the similarities and differences

between the components and dimensions of the skills to achieve their implementation in different areas of teaching.

Strategies and good experiences must be found that have been implemented by different international educational communities that can be replicated in Ecuador. Although some of them are already applied in the country such as the inverted classroom (Cobeña & Rodríguez-Gámez, 2019; (Mero, Pazmino, & Rodriguez, 2019).

Many of these investigations have been put into practice at different educational levels. A specific example is the inverted classroom where students can carry out research from their homes and when they go to the classroom with the teacher in a group. Students debate and share what they were able to investigate   that is specific to the inverted class. This enables the development of skills in the student in order to find a way according to their knowledge for the search for information, analysis, reflection, as integrative processes of learning with ICT and other resources that are relevant for the student to form in relation to their academic and social interests.

The evolution of practices is rapid at present. For example, the introduction of technologies in preschool education where musical intelligence has been practiced (Mero, Zambrano, & Rodriguez, 2020). Education has also dabbled in innovative project-based learning strategies, as an innovative proposal for the local educational system (López, Vegas, & Rodríguez, 2020). Contributions have been made in the techniques of video games and their influence on the teaching process (Meneses, Moya, & Rodríguez, 2020).

Project-based learning is one of the ways in which students acquire knowledge and actively join research in groups, contributing their skills in solving real problems in social practice. The proposed solutions are collated in the group and the ideal one is implemented according to the collegial disposition of the group.

We have already ventured into mobile devices, these appear giving way to a new social, cultural and educational model (Suryasa, Zambrano, Mendoza, & Moya, 2020). Other techniques introduced are marker spaces (Perez, Rodriguez, Rodriguez, & Villacreses, 2020).These are methodologies to promote learning and promote creativity, framed within the principles and values of solidarity of university-level students.

The objective of the present investigation is to carry out an analysis based on categories that include the relevant and most repeated points in published articles and found in reliable sources, which take into account the use of ICT. Specifically, this research project will focus on ICT in the teaching-learning process during the emergency due to the COVID-19

pandemic, to report on international strategies and good experiences that could be replicated in Ecuador.

Materials and Methods

The Desk Research method that can be used in cases where data collection is required and was applied to carry out this research. In addition, the research was carried out by analysing international publications, given the facilities that the internet currently presents (Reina, 2020). The usefulness of this method is not only limited to qualitative studies but also serves to prepare experimental or complementary research based on previous studies and the volume of available information that can be synthesised. International articles related to the keywords: ICT for the teaching-learning processes, innovative training, and strategies during the COVID-19 were used as initial search criteria.

Analysis and Discussion of the Results

The results achieved in this research started from the proposed objectives, which consisted of identifying strategies and good experiences obtained with the use of e-learning in different international educational communities which could be replicated in Ecuador. For this reason, the Desk Research methodology was applied, performing a search in various databases, specifically the databases were considered: Redalyc, ScienceDirect, and Google Academic. Based on the fact that COVID-19 has only arisen this year, only the publications of the year 2020 reviewed.

The name of the application was used as a search criterion. This included the terms: *e-learning and COVID-19.* It was found that the number of publications in scientific journals that associate e-learning applications in COVID-19 are almost non-existent. This could be because it is under development. An analysis was carried out on the published information, but this line of research that is being born will surely generate new knowledge on the subject (Abreu, 2020).

The analysis of the documentation in the first instance allowed the researchers to define the categories involved in the emerging pedagogical understanding including the pedagogies that adapt to the potentialities offered by the Information and Communication Technology (ICT) (Mora & Salazar, 2019).

Among emerging technologies, e-learning arises, known as distance learning or electronic learning. It is a pedagogical strategy used in the educational sector which is based not only on the use in ICT, but also on a type of pedagogy aimed at activities of interaction and collective creation of new knowledge through problem-solving strategies, critical thinking and

reasoning. This is guided towards a construction of knowledge, which starts from social interaction, through collaborative work on computer platforms (Avello & Duart, 2016).

But it is precisely the accessible and flexible implementation of the e-learning strategy in this era of the information society. This strategy that emerged in the early nineties has had a rapid growth in its employment which has been positioned as a very valuable resource for the education sector mainly for distance education (by meetings). The facility provides for communication between teachers and students without the need for physical movements from different places where you have access to the internet and an intelligent device with connectivity to the internet (Ching & Chan, 2020;Sánchez et al., 2020; Delgado et al., 2019; Macías et al., 2019; Reina, 2019; Suryasa, 2020).

Under the restricted mobility situation 91% of the schools have been closed in almost all countries across the world due toCOVID-19. This has been applied to all traditional teaching places including schools, colleges, and universities. Education has been changed by virtual classrooms. Teachers and students have converged to use these platforms to achieve the implementation of innovative strategies that allow the learning process to continue successfully now with the advantages of these new pedagogies. The assimilation process of the e-learning strategy during this short adaptation time (March-May) has been feasible due to a set of conditions that already exist in the face of this contingency, which has accelerated them, as shown in the Figure 1.

Figure 1. Conditions have facilitated the massive implementation of the e-learning strategy in the year 2020.
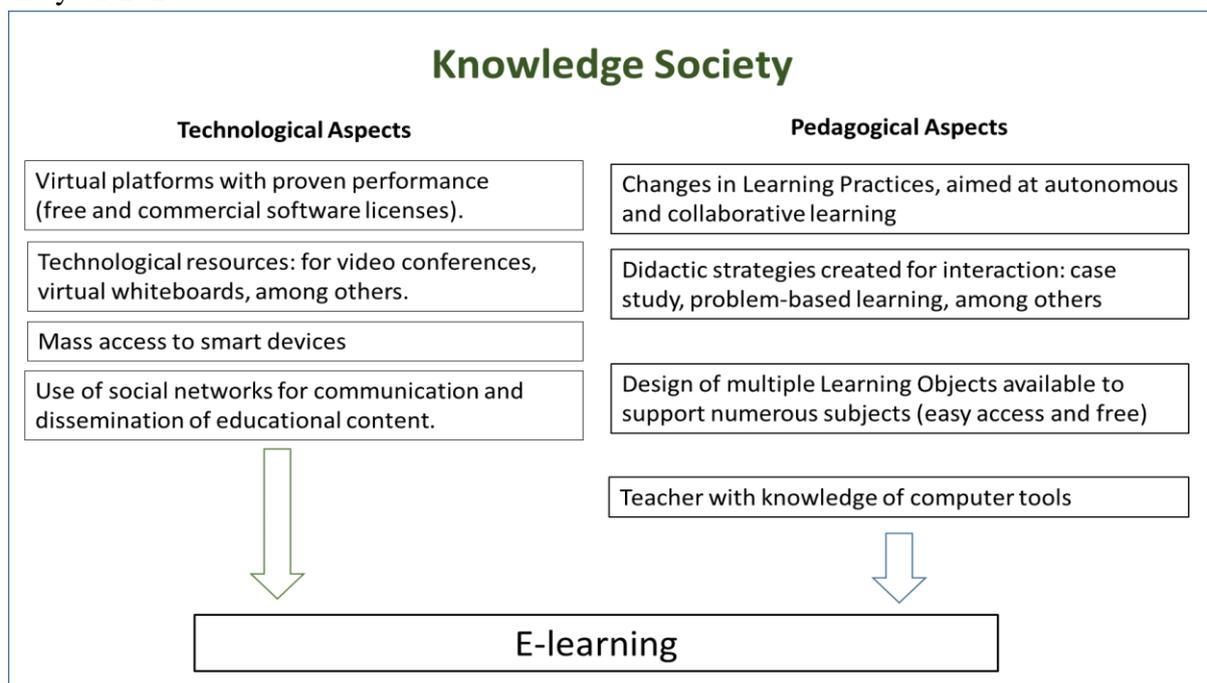
Figure 1 reveals that the virtual platform technologies aspect has been in development for several years. There are around 30 platforms available including: Moodle, UDemy, Chamilo, Course Sites, Bay, Blackboard, Mahara, and Classroom among others. These platforms already have a proven performance, as well as support applications for teaching classes, they have the availability of multiple communication channels (social networks) wide diffusion and dominance by the population. However, these platforms have a very particularly sustained development in terms of philosophies and pedagogical strategies, which make the teaching-learning use of the strategy viable as an active exchange of knowledge based on multiple didactic strategies in which the student is a protagonist of their own learning, who autonomously but also collaboratively makes new constructs in the environment or virtual.

Among the international experiences found, it is worth reflecting initially that of the Autonomous University of Mexico (UNAM) published "Education and Pandemic. An Academic Vision " on May 25, 2020 (Díaz, et al., 2020). This book includes the experiences and visions of the effects of the pandemic for basic education, university education and its implications regarding inequality and gender, technology and connectivity, and gave a set of opinions on future educational trends.

The fundamental approach that is expressed starts from a review of all the aspects that must coincide so that e-learning education can be successfully developed in the situation of COVID-19. Despite the fact that UNAM has a long history of experience in distance education under blended modalities which started in 1971 and has been supported by virtual platforms since 1995, the forced process of migrating all face-to-face modalities to distance modality (e-learning) has caused an impact and a revaluation of various aspects. Both at the educational, administrative, and also student levels for which one cannot be fully prepared.

Among the elements proposed for good practices under this e-learning modality at UNAM, are: the preparation of the teacher with training and the direction for curricular flexibility, highlighting hybrid teaching strategies, which serve as adaptation between face-to-face and the virtual, as well as the incorporation of transversal and dynamic themes that allow addressing different current issues and that considers the environment and the dynamics in which students usually operate.

Among the aspects that must be considered and which the emergency created with COVID-19 has imposed, is rethinking the meaning of school and education and the way we think about a future different from the present. This flexibility in the plans and programs of studies will allow to face the necessary transformation depending on the availability and connectivity of resources of the students. The study carried out by Condor (2020) seeks to identify elements and restrictions present in Latin America at a cultural and resource level. Condor (2020) explores the factors that may hinder the implementation of the e-learning strategy for

the educational sectors during the COVID-19 emergency. The study focuses on considering a series of aspects from a broad context. Condor (2020) indicates that the 3 main aspects to overcome are the following: a) the adaptation of technological resources, b) training of teaching staff, and c) training of the student to adapt to the new teaching-learning model and the resources available with will be available (Cóndor, 2020).

An important limitation of this research focuses on the fact that within Latin America, the country with the most resources for internet connectivity is Ecuador. Ecuador leads the country with the most internet access, with 81% of the population with internet connectivity. This is above the Latin American average of 67%, which is reflected in Figure 2.

Figure 2. Internet penetration in Latin America 2018.
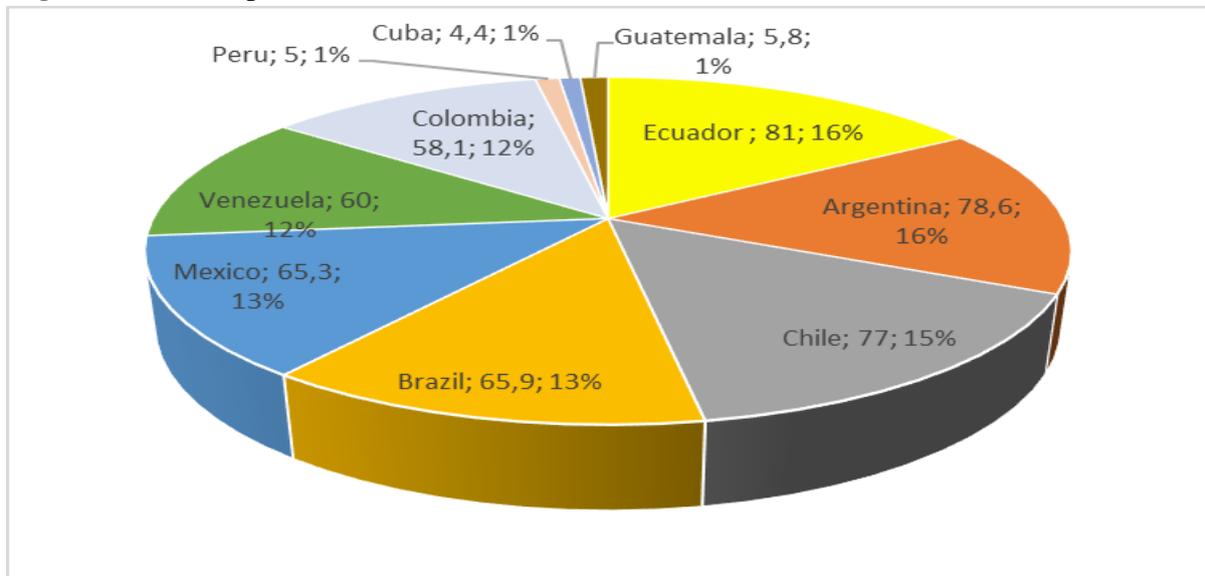
Source: Group, April 2020.

In Ecuador, there is an internet program for everyone, which has been planned as a strategy for several years. It is a government initiative that will be implemented with the support of private companies and will help many people to communicate. Currently, approximately 19% of the population is still missing the connection and many of them are located in rural and peri-rural areas (Michelena, 2019).

According to the feasibility analysis carried out, a digital literacy process must be carried out that allows citizens to obtain more benefits and support the knowledge of those who do not know the benefits of digital services, such as e-government.

In the country, mainly in the province of Manabí, there have been experiences based on scientifically based analysis. These are related to the continuity of substantive functions in

higher education, in exceptional conditions derived from the impact of COVID-19, appreciating the means they offer virtual technologies for the realisation of online teaching, where documents that endorsed the research were analysed (Mendoza, Rodríguez, & San Andrés, 2020).

In the current moment where the pandemic has been hitting the Ecuadorian population hard, many students in rural areas have had difficulties with the connection and in many cases are not receiving classes like others. This is because the proposed plan has not been fulfilled. Despite these difficulties, other alternatives such as Facebook and WhatsApp have been experimented with.

The Facebook application has been implemented as an innovative technique to support educational processes in the time of COVID-19 at the high school level. This has been seen to be an interesting experience and would require information to reach other levels of education in remote places (Zambrano, Benavides & Rodríguez, 2020).

In this research which takes the form of a bibliographic review, inductive-deductive and online survey methods were applied. This reflects that teachers have knowledge of various technological applications with an educational focus. However, students have a higher degree of knowledge in applications such as WhatsApp and Facebook.

Virtual classrooms for different subjects have also gained experience. One in which they are experienced is in Natural Sciences, assessing how virtuality contributes to meaningful learning (Monserrate & Calle, 2020).

Among the elements that have been pointed out in significant experience in These methodologies during the COVID-19, emphasis is placed on considering attention to the dynamics of human-computer interaction, understanding their psychological, social, ergonomic, and organisational factors that are of fundamental importance when it comes to the success of these electronic learning systems (Jordán, Muñoz, & Aparicio, 2020). Therefore, addressing aspects such as the graphical interface (how the course is integrated) that is adequate at the user's cognitive level, is a starting level that must be considered as a very relevant element to guarantee the approach to the user's logic and therefore the achievement of the objectives.

Among other aspects mentioned is the legal framework which must be adequate at the level of educational institutions, directing it to this new situation in which the requirements cannot be the same. This includes attendance, the number of evaluations, as well as other aspects of the routine of daily educational training (Díaz, et al., 2020).

It is from the elements that have been identified by various authors that a fundamental structure for its revision in educational institutions was proposed. In order to establish the improvements that can guide to achieve a satisfactory development of the e-learning strategy, this structure is presented in Figure 3.

Figure 3. Fundamental structure for the successful development of E-learning
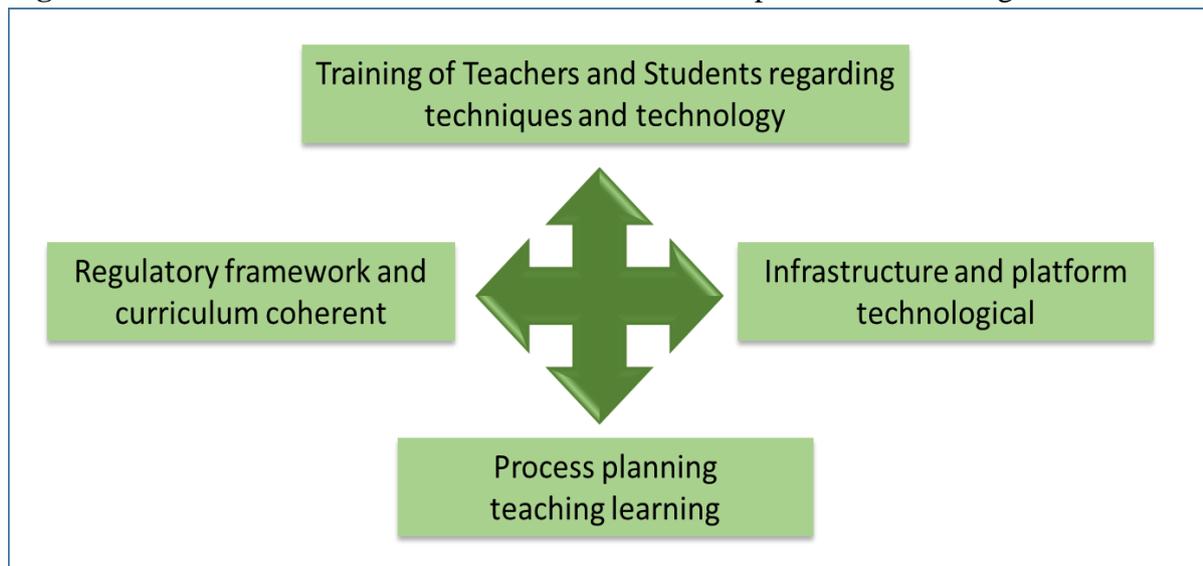
As observed, the four elements observed where the training of teachers and students in techniques and technologies, in the infrastructure and technological platform are linked to the planning processes, the regulatory framework, and a coherent curriculum are linked as the main axis.

According to some publications, the three key elements for success are: content interaction, teacher interaction, and peer interaction (Abreu, 2020;Bonfiglioli, 2020). These characteristics make it clear that the process of building knowledge under the e-learning modality must be a process of interaction and adaptation of teachers and students, which together and that through a process of trust, establish a new forms of teaching, with new roles and challenges to overcome, not only as a response to the COVID-19 confinement crisis, but as part of a new daily reality of educational exchange.

Conclusions

The experiences found so far show that the e-learning has come to conform space to "substitute" for traditional classrooms, which had been gaining space in an emerging way. However, in the face of the COVID-19 pandemic, have become the alternative for training students of all educational levels. The change from face-to-face to virtual modality has meant a change in the structures, processes, and roles of traditional teaching practice, whose main

characteristic is teaching centred on the figure of the teacher, while e-learning is based in the leading role of the student, guided by the teacher towards autonomous and collaborative learning.

The opportunity that this situation of COVID-19 gives us should be valued, to rethink a new way and sense of educating, which even considers changes in the curriculum, leading to the development of new skills and abilities aimed at new learning routes, fundamentally considering aspects such as interaction with content, interaction with teachers and interaction between peers.

REFERENCES

Abreu, JL (2020). Times of Coronavirus: Online Education in Response to the Crisis. *Daena: International Journal of Good Conscience, 15*(1), 1-15.

Alcivar, C. M. M., Quimi, T. L. I., & Barberan, M. F. Z. (2020). The motivation and its importance in the teaching-learning process. *International Research Journal of Management, IT and Social Sciences*, *7*(1), 138-144. https://doi.org/10.21744/irjmis.v7n1.832

Atiqah, N., Na, S., Kim, Y., & Oh, C. (2020). An Analysis of the Horizontal and Vertical Consistency of ICT Skill Standards in Selected Countries and Regions. *International Journal of Innovation, Creativity and Change*, 11(11), 132-146.

Avello, R., & Duart, JM (2016). New trends in collaborative learning in e-learning: Keys to its effective implementation. *Pedagogical studies (Valdivia), 42*(1), 271-282.

Basilaia, G., & Kvavadze, D. (2020). Transition to Online Education in Schools during a SARS-CoV-2 Coronavirus (COVID-19) Pandemic in Georgia. *Pedagogical Research, 5*(4), 123-135.

Bonfiglioli, C. (2020). Periodismo responsable en tiempos de coronavirus – *Jeraa*. jeraa.org.au.

Briones, G. K. P., Solórzano, D. A. N., & Moreira, E. A. V. (1). Rubrics implementation on learning evaluation for superior basic students. *International Research Journal of Management, IT and Social Sciences*, *7*(2), 1-8. https://doi.org/10.21744/irjmis.v7n2.852

Castells, M. (1999). *The information age: Economy, society and culture. Vol. 3, End of millennium. Blackwell.*

Ching, C. L., & Chan, V. L. (2020). Positive emotions, positive feelings and health: A life philosophy. *Linguistics and Culture Review*, *4*(1), 1-14.

Cobeña, M. & Rodríguez, M. (2019). The inverted class as a pedagogical research model. *Cienciamatria*, 5(1 Special Edition), 3-14.

Condor, O. (2020). Educate in times of COVID-19. *CienciAmérica, 9*(2), 31-37.

Delgado, J. L. D., Bone, Y. I. E. B., Lascano, M. A. G. L., & España, S. G. G. E. (2019). Dyslexia as learning problem and its pedagogical intervention. *International Journal of Health Sciences*, *3*(3), 1-7.

Díaz-Barriga, Á., Plá, S., Aguilar Nery, J., Ducoing Watty, P., Barrón Tirado, MC, Alcántara Santuario, A., . . . Andrés Rodríguez, S. (2020). Education and pandemic. *An academic vision*. In: National Autonomous University of Mexico.

Falco, M. (2017). Reconsidering educational practices: ICTs in the teaching-learning process. *Pedagogical trends*.

García, M. d. R., Reyes, JR, & Godínez, G. (2017). ICT in higher education, innovations and challenges / The ICT in higher education, innovations and challenges. *RICSH Iberoamerican Journal of Social and Humanistic Sciences, 6*(12), 299-316.

Group, MM (April, 2020). Internet penetration in Latin America. https://www.internetworldstats.com/stats15.htm.

Guerrero-Moreno, J.; Rodríguez-Jimenez, C.; Gomez-Garcia, G.; Navas-Parejo, M. (2020). Innovación educativa en la educación superior: uso de juegos de rol y videos educativos en la formación de futuros docentes. *MDPI, Sostenibilidad. 12 (6), 2558.*

Hernández, R. M, Orrego, R., & Quiñones, S. (2018). New ways of learning: Teacher training versus the use of ICT. *Purposes and Representations, 6*(2), 671-685.

Jordan, E. d. PA, Muñoz, VIC, & Aparicio, DMS (2020). Human-technology interaction, interfaces and usability. *RECIAMUC, 4*(2), 21-28.

López- López, M., Vegas-Meléndez, H., & Rodríguez-Gámez, M. (2020). Project-based Learning Strategy: An Innovative Proposal for Local Education System. *International Journal of Psychosocial Rehabilitation* 24(1), 1666-1680.

Macías, M. E. L., & Martinez, M. E. M. (2019). Problems of learning and intervention. *International Journal of Health Sciences*, *3*(2), 28-37.

Mendoza-Mera, J.; Rodríguez-Gámez, M.; San Andrés-Laz, E. (2020). Higher education in exceptional situations and the imprint of technology. *International Journal of Psychosocial Rehabilitation*, Vol. 24, Issue 08.147-156.

Meneses Quimis, I., Moya-Martínez., & Rodríguez-Gámez, M. (2020). Influence of Videogames on Student Behavior. *International Journal of Psychosocial Rehabilitation*, 24(1), 1692-1703.

Mero-Alcivar, C., Zambrano-Santos, R., & Rodriguez-Gamez, M. (2020). The musical intelligence as a basic competition in parvular teacher. *International Journal of Psychosocial Rehabilitation*, 24(4), 352-360.

Mero-Chavez, E., Pazmino-Campuzano, M., & Rodriguez-Gamez, M. (2019). An Innovative Proposal for Teaching Learning: The Inverted Classroom. *Journal of Advanced Research in Dynamical and Control Systems*, 11(08-Special Issue), 2531-2540.

Michelena, A. (2019). Internet Para Todos prevé una conexión nacional del 98% al 2021. *El Comercio*.https://www.elcomercio.com/actualidad/internet-conexion-ecuador-tecnologia-4g.html.

Monserrate, N., & Calle, R. (2020). The Virtual Classroom as a Pedagogical strategy in the teaching and learning of Natural Sciences. *International Journal of Advanced Science and Technology*, 29(11), 2609-2617.

Mora-Vicarioli, F., & Salazar-Blanco, K. (2019). Applicability of emerging pedagogies in e-learning. *Pedagogical Essays Magazine, 14*(1), 125-159.

Moreno-Correa, S.-M. (2020). Educational innovation in the times of the Coronavirus. *Salutem Scientia Spiritus Magazine, 6*(1), 14-26.

Pérez, J., Rodríguez-Borges, C., Rodríguez-Gamez, M., & Villacreses, C. (2020). Maker spaces: motivational tool for electrical engineering students at the Technical University of Manabí, Ecuador. *Espacios*, 41(2), 12-16.

Pertiwi, L. W. R., Ariyanto, D., Suprasto, H. B., & Suartana, I. W. (2020). Case-based accounting learning strategies. *International Research Journal of Management, IT and Social Sciences*, *7*(1), 156-161. https://doi.org/10.21744/irjmis.v7n1.834

Reina, A. L. V. (2019). The brain and learning on initial students. *International Journal of Health Sciences*, *3*(2), 38-43.

Reina-Olmedo, L. (2020). Light source. Communication plan. *Linkedin*.

Sanchez, PKM, Pazmino, MF, & Gamez, MR (2020). Prezi as an innovative teaching tool for the strengthening of significant learning. *International Research Journal of Management, IT and Social Sciences* , *7* (1), 72-83. https://doi.org/10.21744/irjmis.v7n1.825

Sánchez, T. M. C., & Martínez, M. E. M. (2020). Brain system influences on teaching-learning process and stimuli. *International Journal of Health Sciences*, *4*(1), 18-24.

Shafi, S., Kazmi, S. H., & Asif, R. (2020). Benefits of code-switching in language learning classroom at University of Education Lahore. *International Research Journal of Management, IT and Social Sciences*, *7*(1), 227-234. https://doi.org/10.21744/irjmis.v7n1.842

Suryasa, W., Zambrano- Mendoza, J., Mendoza-Mera, J., Moya-Martínez, M.; &, Rodríguez-Gámez, M. (2020). Mobile devices on teaching-learning process for high school level. *International Journal of Psychosocial Rehabilitation,* 24(4), 330-340.

Torrecillas, C. (2020). The challenge of online teaching for Spanish public universities in the face of the COVID-19 pandemic. *ICEI*.

Yáñez, C. (2020). Scientists from the U. of Singapore affirm that in October the pandemic will be over in Chile: does its projection have a basis? *The Third*.