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Higher education in exceptional situations and the imprint of technology

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***Abstract*---*The Ecuadorian Constitution recognizes education as a public function of the first order due to the impact It represents for the development of the Country, so guaranteeing its continuity and quality is a priority task for the State. The objective of the work is to carry out a critical scientific-based analysis, related to the continuity of substantive functions in higher education, under exceptional conditions derived from the impact of COVID 19, evaluating the possibilities offered by virtual technologies for its execution. A review result is presented where articles, books, brochures, institutional reports and other documents were analyzed, for which there search method was used Desh Research, which involves the use of existing information, which is collected, analyzed and summarized to increase the general effectiveness of the research, produce critical analyzes and reach precise conclusions on the subject studied. We take advantage of the data derived from a survey of professors and students at a university on the Ecuadorian coast, related to the management of virtual technologies, platforms and tools in the educational process. It is expected that the critical analysis that is addressed in the work will serve as a theoretical reference for university managers and professors in general, to guarantee the required material assurance and an adequate organization in the development of the different modalities that virtual education contemplates, for the fulfillment of the substantive functions of Ecuadorian universities.*

Keywords*---*modalities of virtual education; TIC; exceptional situations; health calamity; substantive functions of the universities.

I. Introduction

For the first pedagogues from the beginning of the 16th century until the end of the 18th century *Comenius* (1592-1670); *Jacques Rousseau* (1712-1778); *Johann H Pestalozzi* (1746-1827); *Juan F Herbart* (1776-1841); *Friedrich Frobel* (1782-1852) (Bohm, 2010); (Abbagnano & Visalberghi, 2019), the exponential dynamic that the educational teaching process would have was unsuspected, under the influence of the voracious technological development that is currently being experienced.

Especially information and communication technologies (ICT) have had a relevant impact on social life. In recent years, the reconsideration of the student's role, as well as the recognition and empowerment of the three

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substantive activities in higher education: teaching, research and connection with society, have had adequate support in the contributions of development. Technological (Aliaga & Bartolomé, 2006).

During the historical social evolution of the last years after the Industrial Revolution, there had not been such an important impact that the one derived from the use of digital computers and the Internet, so that practically all sectors of the public and private sphere have been touched by the imprint of virtuality, especially those linked to the educational teaching process (Peláez, 2016).

In the current technological influx, the concepts of knowledge societies have emerged, which promote the confluence of many spheres: public sector, academia, private companies and citizen participation. In Latin America, like other countries in the world, there has been an interest in achieving technological development, since at the macro level, being highly competitive deserves to revive emulation in good practices in a highly industrialized and technologically competitive world (Peláez, 2016).

In Ecuador, ICT, in the educational system and especially in higher education, involves a technological and investigative aspect, which fosters the training of professionals with a broad vision, allowing the integration of technological changes that occur as a result of globalization (Vinueza & Simbaña), 2017). Despite the fact that these tools are being applied in the teaching process in basic education (Meneses, Moya, & Rodríguez, 2020), (López, Vegas, & Rodríguez, 2020), (Mero, Zambrano, & Rodriguez, 2020), (Mero, Pazmiño, & Rodriguez, 2019). In various innovative processes.

The latest experiences derived from the impact of COVID 19, where it has been necessary to decree the State of Exception for the entire national territory, with drastic measures of social protection that involve distancing people and even isolation in more than a few cases, the imprint of Virtual tools have emerged as a reliable alternative to give continuity to the teaching and research process in universities; what for some constitutes an a priori solution that guarantees continuity and quality in the process and for others it is seen as a temporary and emerging alternative. But what has become clear beyond the debate is that in almost all of the Ecuadorian public and private higher education institutions, the conditions required to meet the challenge had not been created.

Considering the aforementioned, it can be affirmed that the challenge of assuming virtual education in the higher education system in Ecuador is not deserted by difficulties that manifest themselves multidimensionally, among which the following can be pointed out: limited availability of financing to acquire hardware and software for teaching and research purposes; inadequate procedures for purchasing the technologies required to equip virtual platforms, classrooms and university laboratories; limited availability of technological equipment by students; restricted accessibility to network connection and insufficient bandwidth in some university institutions, a problem that affects a significant number of students; poor preparation of teachers and students to assimilate virtual education; insufficient will on the part of some teachers and even managers of the system to predictively assimilate the introduction of technology and a new educational methodology that is imposed and that must be applied; Institutional virtual platforms that are complex and unfriendly for teachers and students.

II. Materials and methods

The research is based on a bibliographic and descriptive review work, which made it possible to characterize the impact of ICT in order to guarantee continuity and quality in the performance of teaching, research (R + D + i) and the link with society in Ecuadorian higher education, considering the limitations imposed by Presidential Decree 1017 that regulates the exceptional situation in the country due to health calamity, managing to establish a diagnostic exploration to systematize from the theoretical scientific analysis, the associated concepts to higher education and the assimilation of methodological changes and transformations that allow predictive adaptation of the limitations inherent in physical distance between people as a measure of social security. For this, a bibliographic review of books, articles, manuals, laws, regulations, institutional reports and other documents that offered reliable information in the interest of deepening the subject studied is carried out, for which there search method was applied *Desh Research* (Joanna Hofman & Sutherland, 2018), which involved the use of existing data, which was collected, analyzed and summarized to increase the overall effectiveness of the research, produce critical analyzes and reach precise conclusions on the topic studied. In the discussion of the results, the opinions of managers, professors, specialists and students linked to higher education are reflected, which allowed to reflect and argue from the theory about the problems raised; All this allowed to reach precise conclusions on the subject studied (Hernández, Fernández, & Baptista, 2010).

For the qualitative analysis of the results, data were taken from a survey of professors and students from a university on the Ecuadorian coast, where an intentional sample of 260 students was determined, who were randomly selected, trying to include both sexes, as well as a part of those residing outside the province and in rural areas. As a tool, a structured questionnaire was used that was applied in the virtual modality.

III. Analysis and discussion of results

Historically, universities were born for the development of teaching as a professional training process. For centuries teaching activity was the primary focus of universities; but in recent years three substantive activities in higher education have been recognized: teaching, research, development and technological innovation (R + D + i) and the link with society, which implies a level of complexity never seen before for the work of managers, teachers and students (Fabré, 2005).

The three substantive functions of the university. Political-legal and financial support

It can be affirmed that an average teacher complies with teaching and if he wants to improve the quality of his work, he needs to seriously investigate, associating his students in this process (Avilés, 2009).

Article 350 of the Ecuadorian Constitution (Constituent Assembly, 2008) confirms that: “The purpose of the higher education system is academic and professional training with a scientific and humanistic vision; scientific and technological research; the innovation, promotion, development and diffusion of knowledge and cultures; building solutions for the country's problems, in relation to the objectives of the development regime. ”

In the constitutional norm itself, article 387, number 2 establishes what is related to the promotion, generation and production of knowledge, promote scientific and technological research, and enhance ancestral knowledge, in order to contribute to the achievement of good living *(sumak kawsay)* (Constituent Assembly, 2008).

The legal framework that regulates the functioning of the universities and polytechnic schools in Ecuador proposes in a sustained way, the planning and execution of actions articulated between the substantive functions recognized as such in the environment of higher education institutions (HEIs); in accordance with the provisions of article 117 of the Organic Law of Higher Education (LOES), in the third paragraph it is stated that: "All universities and polytechnic schools are teaching and research institutions". Later it is established that the substantive functions are: teaching, research and connection with society (National Legislative Assembly, 2010).

In the Law itself, but in article 8, the contribution for local and national development is established permanently, through community work or connection with society. Article 13 corroborates as the first of the functions of the university, to guarantee the right to higher education through teaching, research and its connection with society, and to ensure an increasing level of quality, academic excellence and relevance (Assembly National Legislative, 2010).

In a context of social responsibility, universities in the performance of their primary functions (research, teaching and community service) in a context of institutional autonomy and academic freedom, must focus on interdisciplinary aspects and promote critical thinking and active citizenship. , contributing to sustainable development, peace and well-being, as well as making human rights a reality (Franco, 2017); (Trejos & Ayala, 2018), (Vázquez, Rodríguez, Véliz, C., & Valararezo, 2018).

Universities must contribute to narrowing gaps in development and based on this premise, they must transfer the knowledge and technologies derived from research, so that they become actions that enhance competition. In this sense, interuniversity research and cooperation initiatives must be promoted that open the doors to a broad and balanced academic mobility that guarantees multilateral and multicultural collaboration. For this, projects can be generated that support the recognition and homologation systems of studies (Avilés, 2009); (Franco, 2017).

Learning, research and innovation will be actions that propel the university in the search for new forms of management that allow it to increase its research results through joint initiatives, in which other universities and also public sector organizations and private. Thus, the functions of research, teaching and connection can produce responses aimed at contributing to the solution of social problems that affect the environment (Franco, 2017).

The aforementioned is demonstrating that when it comes to guaranteeing the continuity of higher education in any institution, whether public or private, it is not only a matter of anticipating the traditional teaching function, but also that it is necessary to rethink the forms, methods and resources necessary to ensure the investigative work of teachers and students, as well as links with society.

According to data from the World Bank, Ecuador invests 0.44% of the gross domestic product (GDP) in research and development, below only in the South American region of Brazil with 1.26%, Argentina with 0.54% and Uruguay. with 0.48%; all with an investment below the world average in 2017 that was 2.2% of global GDP (World Bank, 2014). Figure 1 shows the interrelation between the three substantive functions of higher education.

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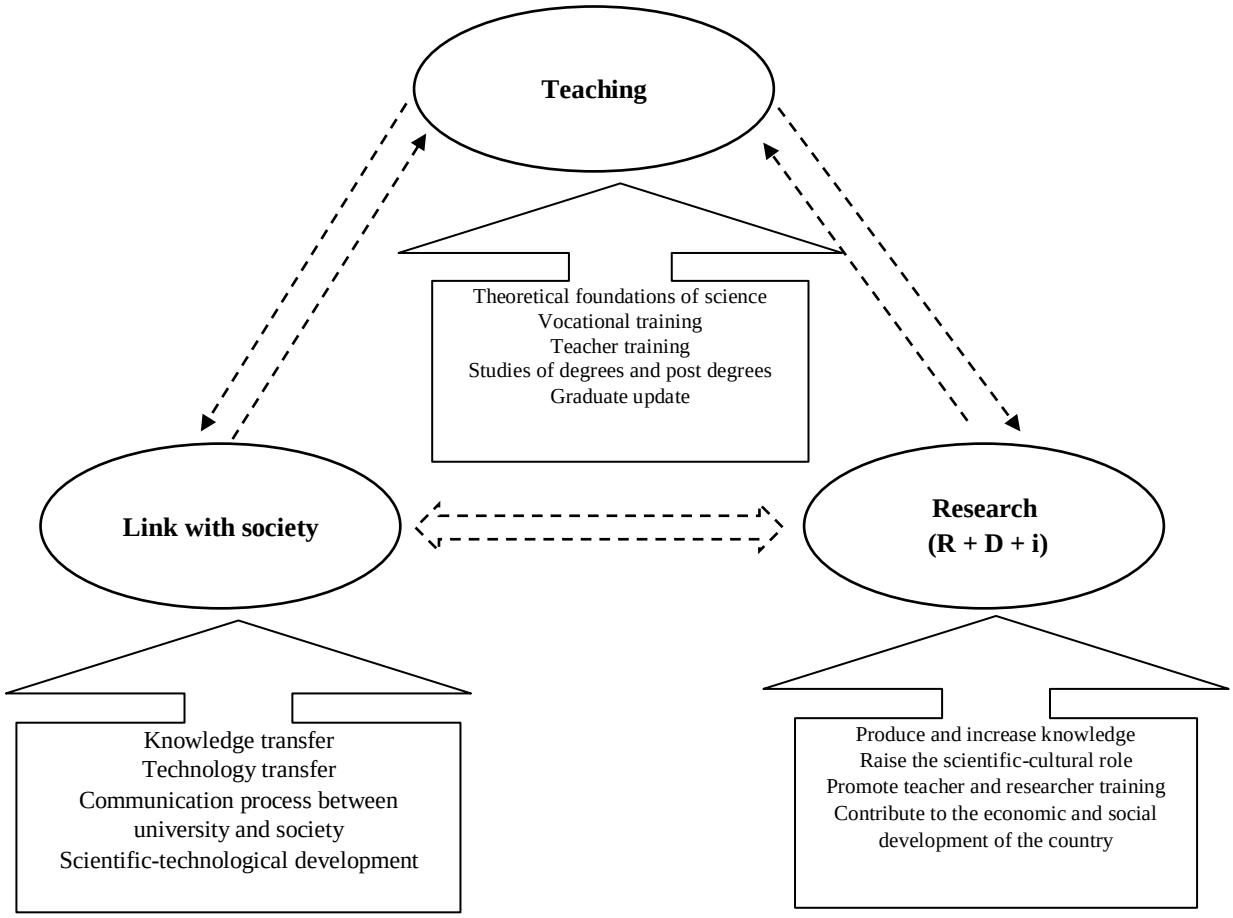

Figure 1. Interrelation between the three substantive functions of higher education

Source: Own elaboration taking information from (Sánchez, 2016)

In the so-called peripheral universities, the allocation of funding for research activity is left to the decision of their managers, protected in the principle of university autonomy, being able to appreciate that in these cases the insurance for research activities and those related to society is practically symbolic, when compared to financing dedicated to teaching.

Analyzing the execution of the annual budget in one of the universities of the Ecuadorian coast, it can be verified that more than 65% is allocated to the assurance of teaching activity and less than 1% respectively is devoted to research and the transfer of results to the social component. Figure 2 shows the relationship that exists during the budget execution, considering the three substantive functions (Honorable University Council, 2019).

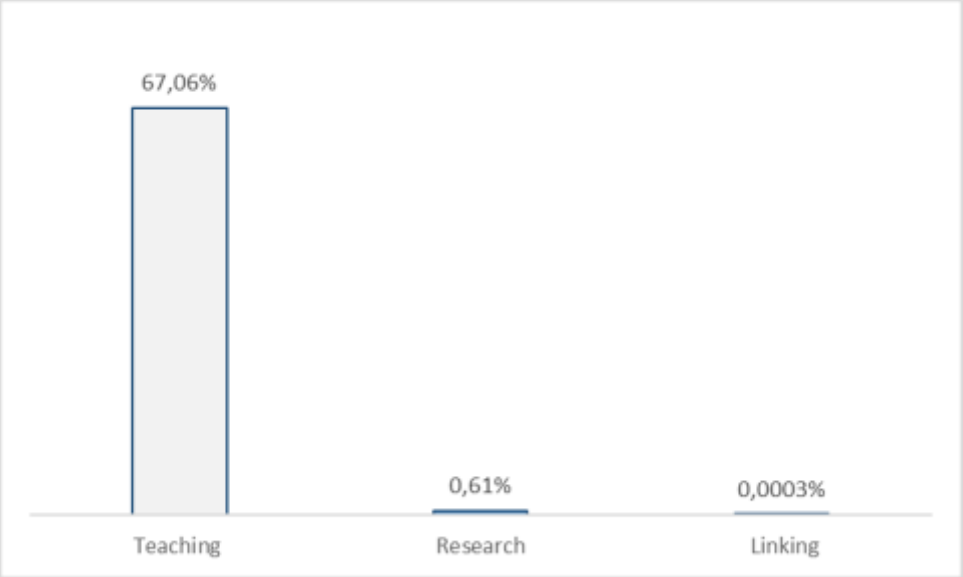

Figure 2. Relationship of the budget execution attending to the three substantive functions

Source: Own elaboration from (Honorable University Council, 2019)

If it starts from the criterion that what is not properly assured is not adequately fulfilled and from Analyzing the marked imbalance that exists in the financial assurance of the three substantive functions, it is possible to estimate that since normal times the planned educational teaching process, as established in the LOES (National Legislative Assembly, 2010), has not been organized and insured according to the indicated; reason why the instrumentation of the virtuality attending to the limitations of physical distance required in exceptional situations, can become more complex from the material and organizational point of view.

ICT and Higher Education

ICT are those resources, tools and programs that are used to process, manage and share information through various technological supports, such as: computers, mobile phones, televisions, portable audio and video players or consoles. game (Gaona, Sierra, & González, 2017).

Particularly, ICTs have penetrated since its emergence and implantation in practically all the strata of the social fabric, highlighting those that occurred during the so-called digital revolution between the 1950s and the late 1970s, especially related to the spread of personal computers and the Internet use (Aliaga & Bartolomé, 2006).

Technology plays a very important role in education, since it facilitates teaching, either virtually or using devices such as the digital projector, the computer and the internet (Hernandez, 2017). Technological changes and the use of ICTs have generated new behaviors and behaviors, such as network communication, built on the basis of personal networks through the internet, facilitating an interactive and rapid exchange of information anytime, anywhere. The contributions generated in its proper use for the construction of activities that nourish learning are undeniable. Thanks to this, a large amount of information can be socialized, constituting an open window to the world, making more people connected and having access to applications, programs and sources of knowledge that previously could not

be obtained due to lack of resources. This makes time and distance barriers shorter, generating more opportunities (Veintimilla, 2017).

Technology has allowed communication to be efficient, effective and lower cost, resulting in society's predisposition towards mediated education with ICT resources, since they contribute to research-based learning, with self-regulated habits and with strategies used to validate the available information, setting guided learning goals (Hernandez, 2017).

One of the modifications with respect to the educational field would be to approach the teacher's work in a different way, adding an added value to their way of expressing their knowledge to students, requiring greater preparation and dedication, since it requires the use of new technologies to to be able to carry out said modification, all this with the aim of achieving the development of the knowledge society and later on in the way of building and transmitting it, in order to be a society not only computerized, but a society that seeks to obtain information beyond the traditional way (Buxarrais & Ovide, 2011).

In the field of higher education, technology should be conceived rather, as a continuum that goes from books or blackboards, through radio or video, to the most advanced computer elements or internet applications, making instrumentation indispensable of new strategies and ideas to create communication, that arouse the interest in the students in front of the subjects treated in classes. Teacher creativity is essential. The preparation of audiovisual material, the teaching update and adaptation of new technologies to the curriculum is necessary to prepare young people to face the social, economic, cultural and political changes that new times impose (Roig-Vila, 2016).

For any university teacher, the strengthening of the technological foundations that strengthen the teaching-learning process must be a priority, for this it is important to articulate the basic principles and benefits offered by virtual teaching. The introduction of technology and the principles of virtuality in education is not explained by causality, but by the perennial need to form a type of person according to an ideal embodied in a competitive society of changing times. To achieve this, the dynamic advances in ICTs must be taken into account, as well as the growing evolution of technological tools and programs that have crossed the traditional way on the subject or study habits (Aliaga & Bartolomé, 2006).

However, in Ecuador there is slowness and delay in the implementation of ICT in higher education, ranking 14th in Latin American countries with 3.46 percentage points in the index of progress towards the knowledge society, only above Bolivia, Honduras, Guatemala and Nicaragua (Mungaray-Moctezuma, 2015), despite the fact that in articles 26, 27 and 28 of the Constitution of the Republic (Constituent Assembly, 2008), it is established that education is a right of every citizen and a compulsory duty of the state, also indicates that the state must give priority to education and therefore, must ensure equal inclusion for all people and citizens who access it.

Currently, public policy around higher education focuses mainly on the construction of knowledge and little is done with the production of new knowledge through research, this implies a change, a transformation of the educational process, eliminating the recurring practice of seeing teachers. as an all-knowing instructor who imparts knowledge to his students. For this, it is necessary to operate transformations mainly with policies oriented towards autonomous research in favor of the generation and production of new knowledge, technologies and the country's own science (Amor, Hernando-Gómez, & Aguaded-Gómez, 2011).

Research activities and links with society are transversal to all the careers taught at the university, ensuring that the production of new knowledge and the transfer of results are guaranteed in the different fields of science, so that When it comes to implementing methodologies and foreseeing the assurances to guarantee the continuity of the educational teaching process in exceptional situations, it must be done considering the three substantive functions of higher education.

In the LOES, articles 1 to 6 establish that the objectives of higher education must be added to the rights that lead to quality higher education with a humanistic cultural and scientific character, promoting the participation of students with the in order to achieve significant knowledge production (National Legislative Assembly, 2010).

Without fear of redounding, it can be affirmed that in Ecuador there has not been enough progress in the use of ICT and in communications infrastructure, a situation that affects national productive development and the creation of jobs for young people entering the labor market.

According to data from the National Institute of Statistics and Census of Ecuador in 2018, it is exposed that 10.7% of people between 15 and 49 years of age are digital illiterates, with the most critical situation in rural areas where it is 19%; only 24.5% of households own a computer; 59% of people have at least one cell phone, being in rural areas 46%; households with Internet access were 37.2%, with the least advantageous situation in rural areas being 16.1%; 50.1% of people had used the Internet, being 38.2 in rural areas; 62.5% of children and young people between the ages of 5 and 15 claimed to have used a computer, in the case of young people between the ages of 16 and 24 it is 75.7% and those between 25 and 34 years of age are 62.8% (INEC, 2019).

The data reflected above demonstrate the need that, in the universities that are traditionally face-to-face, it is necessary to incorporate new ICTs, and introduce new more flexible pedagogical models, especially focused on students, so that they can become the protagonists of a significant new learning and not only consider them as invited actors who maintain a passive position in the face of the challenge of a modern education of the 21st century in a globalized world.

The use of a friendly and relevant virtual platform constitutes a key element for the development of virtuality in higher education. Ecuadorian universities work with the Mooble platform, which is also called the Learning Management System (LMS), constituting a teaching system designed to create and manage online learning spaces adapted to the needs of teachers, students and administrators.

Moodle's philosophy includes a constructive and social constructivist approach to education, emphasizing that students (and not just teachers) can contribute to the educational experience in many ways. Its features reflect this in several ways, such as making it possible for students to comment on database entries or work collaboratively. (López, Marulanda, & Bustamante, 2009). The adequate introduction of ICT to educational models must be done with planning aligned to institutional strategies, responding to public policies. The objective is to achieve openness towards change and innovation and for this it is necessary to support them with economic resources, qualified personnel and training plans (Rivera, 2013).

The Ecuadorian educational model requires training competitive professionals, who can handle new technologies and who can cope with professionals from other countries. For this, educational models are required to

enhance the capacities of students using mainly knowledge development strategies. and the information, that propitiate to increase the advance of the country (Piaget, 1979).

Some directors and teachers of the old school have anchored their concepts and educational habits in traditional education, showing resistance to accept the new methodologies that characterize the university of the 21st century; but it cannot be denied that they have professional training and experiences, which allow them to understand the need to face the challenge for the benefit of higher education, for which it is necessary to acquire the necessary equipment to provide adequate classrooms, which promote the articulation of a system of predictive teaching based on the will and the investigative work that fosters innovation and the transfer of results to society, providing security in the student environment. It becomes essential that teachers handle computer instruments appropriately and without hesitation, in addition to the administrative area having rules for the use of ICT in the teaching-learning process and all the staff that make up the institution assume the requirements (Amor , Hernando-Gómez, & Aguaded-Gómez, 2011).

The above is practically necessary when it comes to dealing with exceptional situations, especially those involving limitations in physical contact between people or restrictions on citizen mobility, where the instrumentation of the teaching and research process in a virtual way can pay off in the interest of maintenance. of an educational process with high quality.

It is officially recognized that the first confirmed case with COVID 19 disease in Ecuador was imported from Spain, which arrived on February 14, 2020. It is suggested that the person contaminated at the time of entry into the country by José airport Joaquín de Olmedo from the city of Guayaquil did not present any symptoms; days later she felt fever and general discomfort, so her relatives took her to a health home in that city. On February 27 of the same year they tested him positive for the Corona Virus, which was officially known publicly on February 28 (Primicias, 2020); (General Secretariat for Communication, 2020).

The disease spread rapidly with virulence never before seen, especially in the city of Guayaquil and other locations in the country, claiming the highest number of lives in the most populated cities. So, on March 17, 2020 the President of the Republic signs Presidential Decree 1017, establishing the State of Exception for the entire national territory (Salamea, 2020).

Article 2 of the aforementioned decree provides for mobilization throughout the national territory, in order that the entities of the central and institutional public administration coordinate efforts within the framework of their powers, to mitigate the effects of the coronavirus and guarantee access effective to the rights of people (Salamea, 2020).

Article 3 of the aforementioned document provided for the suspension of the right to freedom of transit and freedom of association and assembly, for which reason the National Emergency Operations Committee (COE) determined to restrict in general the movement of people and vehicles from 9:00 p.m. to 5:00 a.m., starting Tuesday, March 17, 2020. Later on, article 6 establishes the suspension of the face-to-face working day between March 17 and 24, 2020, a situation that It was extended and to this day it is maintained throughout the country, for all workers and employees of the public and private sector (Moreno, L, 2020), allowing public workers and servants, if the activity allows them, to benefit from teleworking as provided in Ministerial Agreement No. MDT-2020-076 (Madero, A, 2020).

The situation analyzed above implied that the beginning of the course in the institutions of the national educational system was postponed, which was scheduled to take place at the end of April; specifically in the universities

the beginning of classes was postponed until June 1st, however the university professors continued to carry out their work, but under the Ministerial Agreement No. MDT-2020-076 and most of the time was dedicated to the preparation individual professional of each teacher in the use of the tools and the virtual platform. All the effort was directed to guarantee the beginning of the classes ensuring a high quality of the teaching and research process.

On March 25, 2020, the Higher Education Council issued resolution RPC-SE-03-No.046-2020, which, among other matters, guarantees the right to education of students from institutions of the higher education system due to the state of exception that governs the national territory. The document itself states that universities will be able to adapt learning activities so that they can be developed and taught through the use of interactive multimedia technologies and virtual environments through digital platforms. Similarly, it must be ensured that these resources are available to all students and academic staff (CES, 2020). All this confirms the relevance of virtuality as an alternative that ensures the continuity of the teaching process in universities in exceptional situations, where the limitation of physical contact is required and the prohibition of generating activities that involve the gathering of people.

In the first days of May, motivated by the need to make adjustments to compliance with resolution RPC-SE-03-No.046-2020 (CES, 2020), the CES prepared a group of proposals to reform the transitional regulations to the development of academic activities in higher education institutions, due to the state of emergency decreed by the state of emergency caused by the COVID 19 pandemic, where among others, when it comes to the hourly load, it is stated that academic staff with Full-time dedication, they must teach between 22 and 26 hours per week of classes, increasing the teaching load previously regulated between 2 and 6 hours. Later it is reflected that the courses and / or parallels of the careers that have taken up the online modality will be able to count between a minimum of 60 and a maximum of 100 students. It is specified that no course, subject or its equivalents that accept the hybrid modality, may have less than 40 students per classroom. In the document itself, it is proposed to eliminate the granting of 1.5 hours per week for the other teaching activities for each hour of class.

When analyzing the aforementioned, it can be seen that, if the proposals for adjustments to the transitional regulations RPC-SE-03-No.046-2020 were approved, it would cause a significant impact on the quality of the educational process in higher education, since It can be seen that in the analysis of what is reflected in the different proposals, it has not been considered pertinently, that the only relevant thing that is replaced with virtuality is the physical presence of the teacher in the classroom and that even during the first moments of application of virtual modality, a period of adaptation of students and teachers is required, since the imprint of virtuality represents a change in the modality of education that has been traditionally carried out.

With the establishment of Presidential Decree 1017/2020 where the State of Exception was established by the COVID 19 pandemic, it became evident that the continuity of the teaching process in higher education institutions could be guaranteed temporarily through the different modalities of education virtual, so the managers of higher education institutions began a process of clarification and adaptation of methodological plans, reorienting the teaching and research process towards the modalities of virtuality, at the same time as conducting an intensive preparation of teaching staff , in the interest of assimilating the various technologies, tools and platforms that make educational virtuality possible.

During previous work in the framework of efforts to guarantee the challenge of virtuality in the teaching process, creation of new knowledge and transparency of results to society, in one of the universities on the Ecuadorian

coast, specifically in a of its faculties, a survey was carried out using virtual media to teachers and students, aimed at diagnosing the general situation existing to implement a quality virtual education, being able to check the following results. Figure 3 shows the existing graphical relationship on the level of preparation of teachers to use the technologies, tools and platform of virtual education.

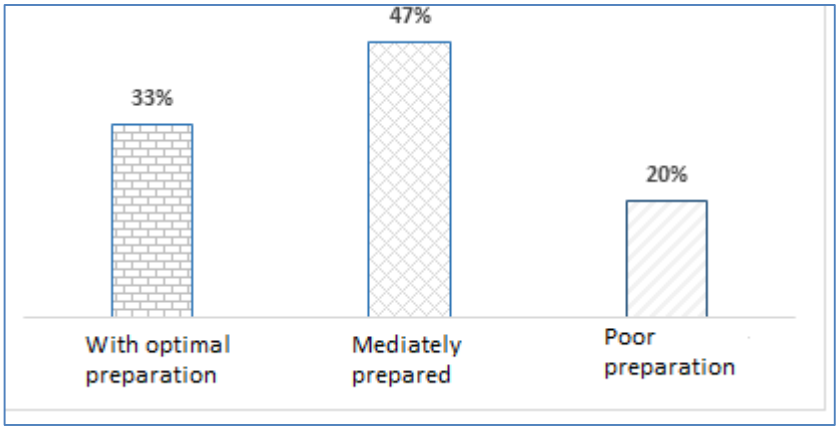

Figure 3. Preparation of teaching staff

It can be seen that only a third of university teachers were prepared to use the technologies, tools and platform of virtual education; a little more than another third suggested that they feel fairly prepared, which did not give them the security to undertake the challenge, unless they underwent emergent training; and a fifth of the total number of teachers surveyed stated that they had poor preparation. After these results, the university undertook an emergent training plan for teachers to use the platform and virtual tools, being able to estimate that the results are currently superior.

Synthetically, it can be said that, prior to the impact of COVID 19, adequate attention had not been given to the preparation of teachers regarding the management of technologies, tools and platforms associated with virtual university education, especially in related to the Mooble platform.

Of the 260 students surveyed, 151 correspond to the male sex for 58% and 109 correspond to the female sex for 42%; 25 reside in other neighboring provinces for 9.6% and 235 reside in their own territory for 90.4%; 108 reside in urban areas for 41.5% and 152 in rural areas for 58.5%. The analysis of the general data on the composition of the selected sample allows us to appreciate a gender balance, with a slightly higher percentage in male students; at the same time that an important component of students residing in rural areas can be noticed.

Figure 4 shows the graphic relationship associated with the availability of technological equipment available to students, in the interest of guaranteeing the continuity of the course in the various modalities of virtual education.

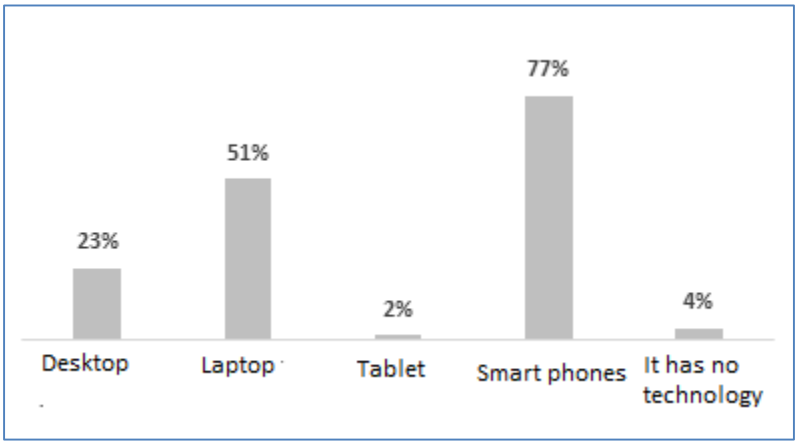

Figure 4. Availability of technological equipment

The analysis of the previous information shows that 96% of the surveyed students have some type of technology that allows them to have access to virtual education; The most advantageous situation arises for the 74% who have access to a computer, either desktop or laptop, as well as those who, failing that, have availability of a tablet or smartphone. The most critical situation arises with those who do not have availability of any technology, which allows them to access the virtual education platform; with these students an alternative solution must be sought. Figure 5 shows the graphic relationship linked to the preparation of students for the management of technologies and tools associated with virtual education.

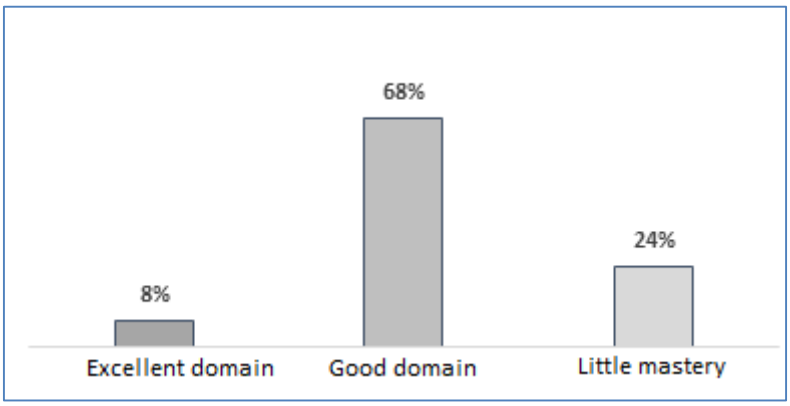

Figure 5. Preparation of the students, for the handling of the technologies and associated tools

The analysis of the previous data allows us to appreciate that 76% of the students have an adequate preparation for the use of technologies and tools associated with virtual education at the university, with 24% of them claiming to have little command of it, which implies that the teachers have to dedicate an initial time to increase and standardize the preparation of the students in order to assimilate the educational virtuality. Figure 6 shows the graphic relationship linked to student access to the Internet.

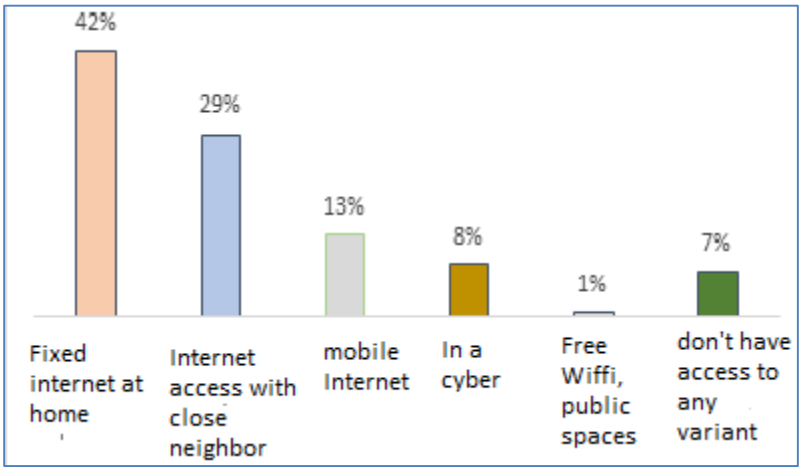

Figure 6. Graphic relationship linked to student access to the Internet

The data reflected above shows that 93% of students have some form of access to the Internet, with the most advantageous situation for 42% having permanent access to their homes; However, there is a 7% that have no way of accessing virtual information. These latter cases should be analyzed particularly in order to find some institutional solution that can help them in this regard. Figure 7 shows the graphic relationship associated with the quality of the Internet signal to which students have access.

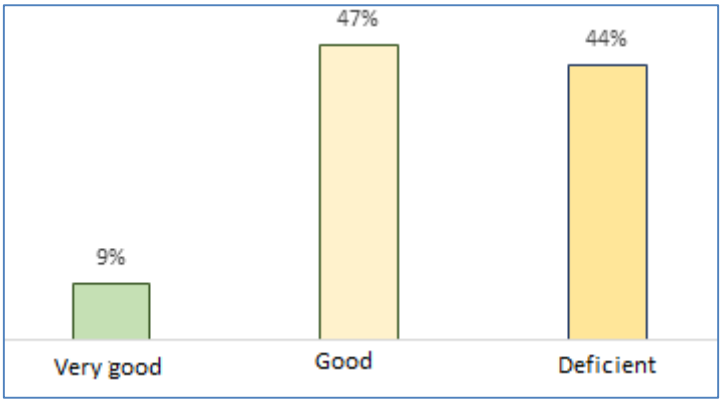

Figure 7. Graphical relationship associated with the quality of the Internet signal

In the information in the graph in figure 7, it can be seen that in 44% of cases they refer to problems associated with poor Internet signal, which causes interruptions and other technical conflicts that affect the reception of information by the media. virtual, subtracting quality and in some cases making classes, conferences and other teaching

and research activities that are carried out incomprehensible. While just under two thirds of the surveyed students say they are in a position to establish a quality signal.

Synthesizing the results of the survey, it can be seen that, considering the limitations of compliance with Presidential Decree 1017 and the restrictions established for physical contact and activities that involve the gathering of people, the conditions for undertaking the academic virtuality in higher education, despite the existence of a group of difficulties of an institutional organizational nature and others linked to the material possibilities that some students present, which can put into play the quality of the teaching, research and relationship process with society to the course from June 1 to October 24, 2020.

The main difficulties are concentrated in: the insufficient preparation that some teachers and students have for the management of the technologies, tools and platform of virtual education; the lack of availability of technologies by some students; the impossibility of Internet access by a group of students and; the poor quality of the Internet signal for just over a third of students.

IV. Conclusions

In recent years, the penetration of technological development summarized in the concepts of the Knowledge Society have been increasingly present in the performance of productive development, services and the political work of society, where the educational function stands out. Never before has any other event experienced such dynamism, explosiveness and acceptance by all social sectors.

The technologies applied in the virtuality of teaching have emerged as a catalyst in the process of recategorizing educational quality, resulting in a key element in raising the professional level of teachers and students in higher education, allowing university graduates to raise their competitive capacity to face the labor market, which increasingly requires more young professionals with a high level of management and technological knowledge.

Higher education requires that its managers project themselves propelled by a professional and political will, which allows constant updating in virtual technologies and platforms, for which a firm investment intention must be displayed, apart from formalities, which allows maintaining the updating of teachers and students in teaching, research and the transfer of results to society.

The work allowed verifying that in some cases an adequate technological update has not been achieved in higher education, which can be seen in the poor updating of the preparation presented by some teachers and the limitations faced by certain students, to face the challenge of virtuality in the teaching and research process, as an alternative to the continuity of the substantive functions that higher education has set out, given the limitations derived from the impact of the disease COVID 19.

The sample on the insufficient preparation of higher education to take on the challenge of educational virtuality, was evident with the arrival of COVID 19 in Ecuador, since the experiences of its impact in the Chinese province of Hubei having been known in the middle of the month of November 2019, measures were not taken by higher education managers, as well as in universities, to increase the technological level of institutions in the acquisition of new technologies (hardware and software) for teaching and research, enable virtual laboratories taking advantage of

the physical space of the classrooms, raise the level of internet connectivity, as well as raise the preparation of teachers and students to adequately assimilate the implementation of the various models in virtual education.

The technical benefits that technology offers allow teaching and research work with better economic performance, better use of time and space, stimulating professional entrepreneurship and intensively deploying innovation associated with research, as a mechanism for generating new knowledge, guaranteeing the transfer of results to society.

Considering the complexity and multidimensionality of virtual education in higher education, the work did not set out to exhaust the topic addressed, which was practically impossible in the limited space offered by the publication of a scientific article; But when considering the multitude of factors that are analyzed, it is advisable to go deeper into the study of the subject, particularly specifying the correlation of the phenomenon of virtual university education in urban and rural areas.

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