Challenges of the accelerated implementation of on-line learning in higher education in Paraguay

Reptes de la implementació accelerada de l'ensenyament en línia a l'educació superior de Paraguai

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Data de recepció de l'article: 5 de setembre de 2022

Data d'acceptació de l'article: 17 d'octubre de 2022

Data de publicació de l'article: 2 de maig de 2023

DOI: 10.2436/20.3007.01.185

Abstract

In Paraguay the accelerated context of change from face-to-face-learning to on-line learning was established by the National Council for Higher Education (Consejo Nacional de Educación Superior, CONES) in a situation which had led most higher education institutions in the world to apply emergency remote teaching (ERT). The fast implementation of this palliative modality generated challenges in terms of development of digital skills, pedagogical practices, educational policies, and investment in infrastructure and in breaching the digital gap. This research seeks to evaluate the impact of on-line learning implementation on Paraguayan higher education as adopted in an emergency context, and to assess its sustainability in Paraguay. Thus, 13 open interviews were made by video calls (n= 13) to professors working in 15 different institutions. The collected data was analyzed qualitatively with Atlas-ti. From the results emerged eight inter-related categories of different ways of influencing the relationships among the three main actors: institutions, students and professors. The main categories which emerged were adaptation and implementation, digital-skills deficiencies, access to infrastructure, self-regulation, skills development, lack of institutional policy, emotional issues, and socioeconomic problems. Some of these issues interact with others and they are of significance to enable, maintain or offer different types of on-line learning education methodologies, highlighting aspects that the Paraguayan educational society needs to strengthen according to its actors.

Keywords

Emergency remote teaching, on-line learning, pedagogical design, digital skills.

Resum

Al Paraguai, el context accelerat de canvi de la metodologia de l'aprenentatge presencial a l'aprenentatge en línia va ser establert pel Consell Nacional d'Educació Superior (CONES) en una situació en la qual la majoria d'institucions d'educació superior del món va aplicar l'ensenyament a distància d'emergència (ERT, de l'anglès *emergency remote teaching*). La ràpida implantació d'aquesta modalitat pal·liativa va generar reptes pel que fa al desenvolupament d'habilitats digitals, pràctiques pedagògiques, polítiques educatives i inversió relacionada amb les infraestructures i la bretxa digital. Aquesta investigació pretén avaluar l'impacte de la implementació de l'aprenentatge en línia en l'educació superior paraguaiana adoptada en un context d'emergència i la seva sostenibilitat al Paraguai. Així, es van dur a terme tretze entrevistes obertes per videotrucada (n = 13) a professors que treballen en quinze institucions diferents. Les dades recollides es van analitzar qualitativament amb Atlas-ti. Els resultats van fer emergir vuit categories relacionades entre si, de diferents maneres d'influir en les relacions entre els tres actors principals: les institucions, els estudiants i els seus professors. Les principals categories sorgides van ser l'adaptació i la implementació, les deficiències en competències digitals, l'accés a la infraestructura, l'autoregulació, el desenvolupament d'habilitats, la manca de política institucional, els problemes emocionals i els problemes socioeconòmics. Algunes d'aquestes qüestions interactuen amb altres i són rellevants per poder permetre, mantenir o oferir diferents tipus de metodologies d'aprenentatge en línia, i assenyalen requisits que la societat educativa paraguaiana ha de reforçar des de la veu dels seus actors.

Paraules clau

Ensenyament a distància d'emergència, aprenentatge en línia, disseny pedagògic, competències digitals.

Com fer referència a aquest article / How to cite this article:

Jara Ocampos, A. M., Fuertes-Alpiste, M., i Rubio Hurtado, M. J. (2023). Challenges of the accelerated implementation of on-line learning in higher education in Paraguay. *Revista Catalana de Pedagogia,* 23, 3-24. https://doi.org/10.2436/20.3007.01.185

1. Introduction

At the end of 2020, Bates (2020b) advised institutions that applied on-line learning in the framework of COVID-19 to include in the analysis the use of time for planning for the future, for making institutions more resilient or for improving their emergency management. In this regard, the change from face-to-face learning to virtual education had an impact on the higher education institutions in Paraguay during the pandemic (Consejo Nacional de Educación Superior [CONES], 2020). With respect to measures for the emergency adoption of distance-learning education (García Aretio, 2022), in Paraguay, as in several other countries in the world, the policy was implemented by the authorities (Comisión Económica para América Latina y el Caribe [CEPAL] & Oficina Regional de Educación para América Latina y el Caribe [OREALC], 2020; Moreno Bau, 2021; Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura [UNESCO], 2021). This change in methodology extended from March 2020 until the end of 2021 (CONES, 2021). The accelerated process of adoption and, consequently, the impact achieved in these years, prompted an evaluation of the challenges of virtual/hybrid teaching methods (Hrastinski, 2019), as well as of the unexpected difficulties which arose and the best resilience experiences adopted by institutions and their actors (Almaiah *et al*., 2020; Barbour *et al*., 2020; Bates, 2020a; Edelhauser & Lupu-Dima, 2020).

In this emergency-remote teaching (ERT) scenario (Hodges *et al*., 2020), several challenges arose as a result of the crisis response, namely, the application of a strategic digital transformation (García-Peñalvo, 2020; Sianes-Bautista & Sánchez-Lissen, 2021), the need for enabling infrastructure and bridging the existing digital gap (UNESCO, 2021), as well as the recognition of the deficiencies in learning and teaching digital skills (Cabero-Almenara *et al*., 2020; Castañeda *et al*., 2021) and dealing with the influences of the pertinent economic, emotional and social situations (Colás Bravo *et al*., 2005).

However, according to Bates (March 9, 2020a), since March 2020 there were waves of research about ERT carried out in response to the unprecedented emergency, and most of the published research was conducted quickly and was poorly elaborated, which may have led to biased information. At that point, various Paraguayan researchers conducted studies on the mandatory emergency adoption of virtual learning in Paraguayan higher education, as was the case of Brítez (2020), Guillén & Chávez (2021), Cardozo *et al*. (2021), Noguera (2020), and Picón *et al*. (2020), who concluded that the main difficulties were: lack of understanding of the assigned tasks for students, lack of motivation and connectivity problems especially in the interior of the country for professors and students, as well as the difference in devices from which students had access. These results are in line with Kuan-Chung (2021), who states that many higher education institutions had already possessed active platforms for a number of years, but the accelerated adoption posed human and technological challenges, such as the development of digital skills in record time, as well as the provision of sufficient computer devices and good Internet connection to the staff organizations. Our study seeks to determine the main challenges that higher education institutions had to face during the COVID pandemic as perceived by teachers and managers.

1.1. Higher education and adaptation to the new scenario

We start from the premise that for students, the meaning of higher education in the curriculum is to ensure a well-paid career (Barnett, 1990). Indeed, in a specific organizational context, Meyer *et al.* (2007) postulate that higher education is considered to comprise a set of terms including specific or local organizations, roles, interactions and economic transactions, integrated with actors who are students as individual persons, within a group of peers, and teachers as individual persons. At the supranational level, in 1997 UNESCO established higher education as a set of educational programs integrated by universities or other establishments, previously authorized as institutions of higher education by competent authorities of each respective country and/or by recognized systems of homologation (SITEAL, 2019). In this respect, the Paraguayan educational system includes general education, special system education, and other forms of educational service, such as distance university education and blended learning (CONES, 2016).

In this context, according to Grau-Perejoan (2008), "on-line learning is explained as a type of distance education based on new technologies, where its main characteristic is asynchrony, non-presentiality, written communication, e-teacher role" (p. 123). For instance, virtual education (on-line), or training in virtual spaces, makes available both study materials and the teacher-student relationship exclusively through communication networks, mainly including the Internet (Garcia-Aretio, 2021). Therefore, the Internet offers a wide variety of new tools and forms of communication. As stated by Moore *et al.* (2011), it "is important to know how the learning environment is used, and the influences of the tools and techniques that distinguish the differences in learning outcomes as the technology evolves" (p. 129). For example, the work of Saichaie (2020) indicates a blurring of boundaries among blended, flipped, and hybrid (BFH) learning.

Virtual learning environments (VLE) are teaching and learning management systems which correspond to the set of means of synchronous and asynchronous interaction, where the teaching and learning process is developed, promoting the construction of knowledge from individual to collaborative learning through interaction and collaboration between the actors involved, with the use of innovative tools that mediate or allow access to non-traditional resources and tools within the process (Araque *et al*., 2018; Gros *et al*., 2006). Moreover, for Ledo *et al*. (2008), the VLE focuses on the theories of learning and its processes' own expectations and needs united and facilitated by the intensive use of information and communications technology (ICT) and networking within a techno-pedagogical model, which ensures significant education, with the challenge of maintaining and raising the quality of the teaching-learning process. Also, digital technologies are applied in education in a systematic way when designing, implementing, and evaluating the teaching-learning processes, supporting their development in the classroom activities and therefore reinforcing them (Mujica, 2020; Villeda, 2019).

Recently, Hodges *et al*. (2020) explained that "on-line learning experiences are meaningfully different from courses offered online in response to a crisis or disaster" (p. 1). During ERT responses, as on-line learning unfolded in an unprecedented situation of

staggering difficulty, campus support personnel and teams worked under stressful conditions, improvising quick solutions in less-than-ideal circumstances. Also, institutions made different decisions and invested differently, thus obtaining varying results and solutions from one institution to another, even if they had planned and implemented on-line learning programs or blended learning programs before the pandemic. As mentioned in Ezra *et al*. (2021) and Zhou *et al*. (2021), ERT has become the prevalent form of learning at many universities worldwide. Many people have pointed out its difficulties for on-line learning in general, as well as concerns regarding challenges for educational equity such as socio-economic status, self-regulation, language, and e-learning acceptance.

1.2. Challenges in the application of ERT

In this context, ICT policy is also important. ITU (2022) informs that in 2020 the total Paraguayan individuals using the Internet represented 74% of the population, but only 37% had ICT-access at home (12% rural and 51% urban). To highlight this idea, the UNESCO IESALC (2021) exchange of information data map shows that education was partially open (hybrid and open in some programs) in Paraguay, with a 38.38% vaccination population and 74% Internet access, and that about 16 other countries were in the same situation and Uruguay alone was completely open. As Chamorro Cristaldo (2018) said, ICT access allows people to participate in society and to become familiar with them, as well as to make better use of their benefits. Laurillard (2008) urges a rethinking of the digital technologies as contributors to the educational policy, with a potential to update educational models that already exist. However, technologies also constitute an element of exclusion, called the digital divide (Vassilakopoulou & Hustad, 2021). It is a transversal phenomenon that affects the educational, work-related and social environments of individuals, communities, and countries. Likewise, there is a phenomenon called the generational digital divide. It occurs when teachers do not have sufficient digital or technological skills or do not adapt to technology (Sanchez-Prieto *et al.,* 2020). Within this context, students from urban areas have obvious advantages over those from rural ones. The presence of on-line education-related amenities includes computers, smartphones, and Internet access (Gu, 2021). Also, UNESCO & Galperin (2017) highlighted the need to promote on-line content and services as part of the digital inclusion policies across the Latin American region, considering that affordability is the main access barrier for connected users.

Furthermore, the process of implementing ICT was analyzed in the context of palliative and emergency education in Paraguay, without the harshness of traditional educational planning. An on-line learning plan should be analyzed using a parameter based on Learning Experience Design as discussed by Fournier & Kop (2015), or the Instructional or Pedagogical Design proposed by Londoño (2011), according to the application of technology-mediated education and the digital competences of its users (INTEF, 2017; Punie & Brecko, 2014). Regarding its application, García-Peñalvo (2020) points out the need for a strategic virtual vision based on the imminent digital transformation, in which the institutions that redefine their vision and adapt their digital processes will have greater opportunities in the future. For Fuertes-Alpiste (2020a), the Analysis, Design, Development, Implementation and Evaluation (ADDIE) model in the interactive instructional design process in synchronous or asynchronous spaces is fundamental in

virtual education, where the results of the formative evaluation of each phase can lead the instructional designer back to any of the previous phases for constant improvement in virtual classroom performance (Fuertes-Alpiste, 2020b).

For the review of the pedagogical techniques which were implemented, it is important to consider learning in contextualized significant environments (CCS) proposed by Papert (1999), Santos & Schlünzen (2017) and Valente (1999). The activities of learning by doing are the best and most significant teaching-learning strategy. Quintana & Aparicio (2017) present the collaborative didactic methodologies that integrate ICT, associated with specific technologies – such as gamification, flipped classroom, problem-based-learning (PBL), personal learning environments (PLE), massive and open on-line courses (MOOC), mobile learning (m-learning), storytelling and transmedia narratives or computational thinking, among others.

The increasing levels of student enrollment in on-line programs led to high rates of attrition in on-line classes compared to face-to-face classes. To address the lack of persistence of undergraduate on-line students, universities must create and implement interventions that prepare them for on-line learning environments and for development as autonomous learners (Stephen & Rockinson-Szapkiw,2021). At the same time, the need for instructors to utilize best practices in on-line instruction and course design is crucial (Wandler & Imbriale, 2017). A core aspect of human functioning is self-regulation, which helps to facilitate the successful pursuit of personal goals (Inzlicht *et al*., 2021). Similarly, the reciprocal influence of knowledge on the self-regulation of learning and ICT skills emerges as a challenge to promote a strategic use of digital applications, in order to foster inclusive quality learning in the university within the context of emergency on-line education (Infante-Villagrán *et al*., 2021). Del Arco *et al*. (2021) highlight the need for universities to apply models of support and tutoring, especially for students in their first years at the university, in order to develop competences such as autonomy, digital skills, and self-regulation. On the other hand, self-regulation directs and controls emotions positively, and allows individuals to withhold decisions until sufficient information is collected (Iqbal *et al*., 2021).

The work of Cañete-Estigarribia (2021) brings us closer to a study of actions that were undertaken by the Government of Paraguay for the development of digital teaching skills in Paraguay between the years 2012 to 2020, identifying problems observed in terms of ICT integration, including insufficient allocation of economic resources, poor teacher training and limited use of technologies, also in training for the use of ICT and the training of teachers in new pedagogical methodologies promoting the transformation of educational practice through the appropriate use of ICT. Additionally, Cañete-Estigarribia's *et al*. (2022) study of auto-perception of the digital competence of teaching students revealed that there is a need for continuous training in the digital competence of future teachers. Lastly, associated with the quarantines, Tomassi (2021) mentions negative aspects connected with the pandemic, including shortages, loss of work, economic crisis, lack of attention in healthcare centers with respect to other disorders, closure of educational institutions together with distance education, reduction of freedom, and consequences for mental health. Irrespective of geographical location or wealth, the pandemic not only had a negative impact in the social, economic and educational spheres but also in every other field of human life including faith,

religion, etc. (Das *et al*., 2022). According to the Instituto Internacional de la UNESCO para la Educación Superior en América Latina y el Caribe [IESALC] (2020), the current results suggest that, on a global scale, the main concerns in higher education were social isolation, financial issues, Internet connectivity and, in general, the situation of anxiety relating to the pandemic. Policies addressed to dealing with the problem highlighted the support of the faculties of psychology and student welfare services in some institutions.

2. Material and methods

For the evaluation of the challenges assumed during the change of the teaching modality that arose with the pandemic, considered within the framework of the application in Paraguay of CONES Resolution No. 4/2020 of March 21st and the accelerated implementation of on-line learning, it was important to estimate the dimensions to which the actors attributed greater importance. For this research, we designed and created an open in-depth interview which was validated by two independent educational researchers, as an instrument to collect initial primary data. This qualitative method approach offered a flexible design to the participants and a semi-structured script with eight open and flexible questions, which allowed the collection of information with less bias and influence from the interviewer (Mendizábal, 2006; Ñaupas *et al*., 2014).

A sample of 13 (n=13) participants was obtained through intentional and snowball sampling, with recommendations from the main interviewees, who are referents of higher education, through individual video call interviews with Microsoft Teams tool, and tabulation and analysis of results made through Atlas-ti. These interviews allowed an understanding of the main challenges in Paraguay reflected from the perspective of three major actors: the institutions in charge of implementing and strengthening the completely virtual education model in the 2020/2021 period; the professors in charge of the training process, production of digital content and evaluations; and students, who learn through virtual environments and digital technologies. To make their interaction visible, a conceptual map and an indicator categorization model were developed on the challenges assumed during the COVID-19 pandemic, indicating the aspects that should continue to be strengthened in the event of establishing a subsequent mixed or virtual educational offer.

Content analysis (Abela, 2002; Porta & Silva, 2003) of the individual interviews was conducted with Atlas-ti to identify the main challenges that the educational community went through from the perspective of its members who were institutional representatives and teachers.

2.1. *Interview with experts*

The representation of higher education institutions was defined through invitations to referents in the directory of the General Directorate of Digital Inclusion and ICT in Education - MITIC (2020, December), for which contact was made via telephone, e-mails, and social networks (WhatsApp, LinkedIn), to arrange for the personal and voluntary participation of higher education directors and professors from 15 different institutions in the country, who gave their consent through an on-line form application. The samples were taken through recorded video calls, complying with the permissions, and

supporting documentation for the use of information based on the policies of ethics and protection of personal data (Universitat de Barcelona, 2020). Later, the data was transcribed and analyzed using Atlas-ti software, to make categories emerge and obtain a better comprehension of the relations of the subcategories and their influence on each other. All incorrect answers were discarded and excluded from the analysis.

3. Results

As may be seen in Table 1, the content analysis of the interview transcriptions showed the main categories identified, by greater frequency of mentions and coincidences in their explanations. Specifically, the following aspects were evidenced, approaching the main challenges of higher education in Paraguay, when implementing and seeking to strengthen the completely virtual education model between 2020 and 2021, through three actors: institution, teacher, and student. It is important to understand that a category could affect a single actor or influence two or three actors at the same time, with causal networks between categories and the possibility of being associated with or forming part of another category.

TABLE 1

Categorization model and indicators of the challenges assumed during the COVID-19 pandemic in higher education institutions in Paraguay

	Code	**Comment**	**Code groups**	**Frequency**	**Actor involved**
1	Adaptation and implementation	Implementation and strengthening of VLE and digital technologies.	Challenges	11	Institution
2	Competence deficiencies	Need to improve digital skills necessary to develop in synchronous and asynchronous virtual distance education.	Challenges	8	Teachers Students
3	Infrastructure access	Enabling infrastructure in the field of the digital divide, equipment, data transfer services.	Challenges	5	Institution Teachers Students
4	Self-regulation	Ability to manage change and develop practices in digital methodologies.	Challenges	5	Teachers Students
5	Skills development	Training activities to foster digital skills.	Challenges	5	Teachers Students
6	Lack of institutional policy	Slow institutional response, lack of guidelines, focus on meeting academic objectives.	Challenges	5	Institution
7	Emotional and social	Disinterest, demotivation, frustration with the change in teaching and learning methodology, lack of adequate environment and workload according to the activities.	Challenges	3	Teachers Students
8	Economic problems	Job losses, students, teachers, relatives, high cost of Internet service.	Challenges	3	Teachers Students

SOURCE*:* Data taken from the project in Atlas-ti (2021).

Next, we outline the eight challenges that were elicited by the participants.

3.1. *Adaptation and implementation*

This category is related to all the processes of adoption of the distance on-line learning modality, which was led by the higher education institutions in charge of applying the virtual modality as a mandate of CONES, which established policies, systems and regulations of functions and processes of the virtual teaching format.

It was inferred from statements about the availability of digital tools and the search for unidirectional solutions by teachers, as was expressed by this statement: “When a tool did not work, we had to experiment with a new one, explore one and the other, and when we came to have an affinity with one, the pandemic was ending.” Four of the interviewees mentioned the challenge of adapting to the virtual methodology, which was a very important change to which they were not accustomed. As one participant explained, “in person, where the dynamics were different, the presentation I made about the unit took some time and then had different types of practices, e.g., group work and reading guides, among other things. In the matter of demography, the unit of data sources, students went out to face the process of data collection at a certain time, there was a particularity in terms of experience, because I was teaching, putting into practice that type of participation in the classroom”.

3.2. *Lack of institutional policy*

In Paraguay, the school year begins in March, coinciding with the declaration of isolation due to a health emergency. There were institutions that were slow to establish guidelines and quick institutional policies at the beginning, even believing that it would end in a few months. This process of issuing directives to some institutions took between one and three months. This situation was expressed by five of the participants with comments such as “our first challenge was to get involved with the tools because there was no directive from the authorities at the beginning” or “we started classes in March and we could not start the semester. In April we started with the knowledge we had”.

3.3. *Infrastructure access*

This category is closely linked to the “digital divide”, which can be understood as the difference in access and use of new technologies, both in national and private institutions, where the greatest number of resources are found in private institutions and more limited in public ones. It was identified by five professors, indicating that it affects the institution as well as the teaching and student members, and that for some the conditions were not right, as explained by the teachers in the following comments: “the e-learning project cannot be sustained economically owing to the investment that something like this represents, so we finally gave up on it” or “students had to access a greater amount of data but most did not have monthly plans and were charged against invoice, for example: that was the constant problem”. All this mainly refers to the coverage and quality of Internet services and to access to computer equipment from institutions. It should be noted that a lot of the learning occurs through the Internet using electronic devices (m-learning or mobile learning), especially including mobile phones.

3.4. *Competence deficiencies*

Competence deficiencies relate to the need for the development of digital skills of both students and teachers. According to the participants, at the beginning of the pandemic teachers and students had a low degree of digital skills for use in virtual learning and for application in activities and jobs, be these synchronous or asynchronous. This was

referred to by eight of the interviewees, with comments such as “it took more effort because there was no expertise in development of virtual classes”.

3.5. *Skills development*

The institutions provided training to develop and strengthen skills, both of students and teachers. In this respect, five interviewees mentioned the commitment of the institution to offer courses and training to level digital competences: “We had many training sessions and made constant changes”.

3.6. *Self-regulation*

With respect to competence deficiencies of teachers and students, five participants mentioned the initial problem of being able to adapt to change, as well as autonomy for teaching and learning. There were comments such as these: “Although some of us had been working on virtual events, it is a different dynamic in the virtual classroom” or “when the pandemic arrived, we were not prepared to convert the face-to-face open classroom to a much more closed virtual one, some people say, but for me it is much more open from home because I can switch roles while staying in the virtual classroom”.

3.7*. Emotional and social*

Within this context, the situation of teachers and students as one requiring effort and resilience to adapt to virtual distance learning was cited by three participants. They explained that cutbacks were made in teacher salaries in all institutions, or that teachers did not have the necessary equipment to carry out their digital activities. At a more personal and psychological level with respect to professors and students, the change of modality was perceived as complex, both for migrants and immigrants, which discouraged certain opportunities, but they were corrected over time thanks to the investment of the institutions and the education of teachers and students. In relation to this, the participants explained: “In fact we did the first year only virtually, and the result was that only seven of twenty students finished the course” or “in a technological faculty, in subjects that the students did not consider very important, in which students think that programming is their world, they minimize the importance of subjects such as Spanish language and literature or accounting”.

3.8. *Economic problems*

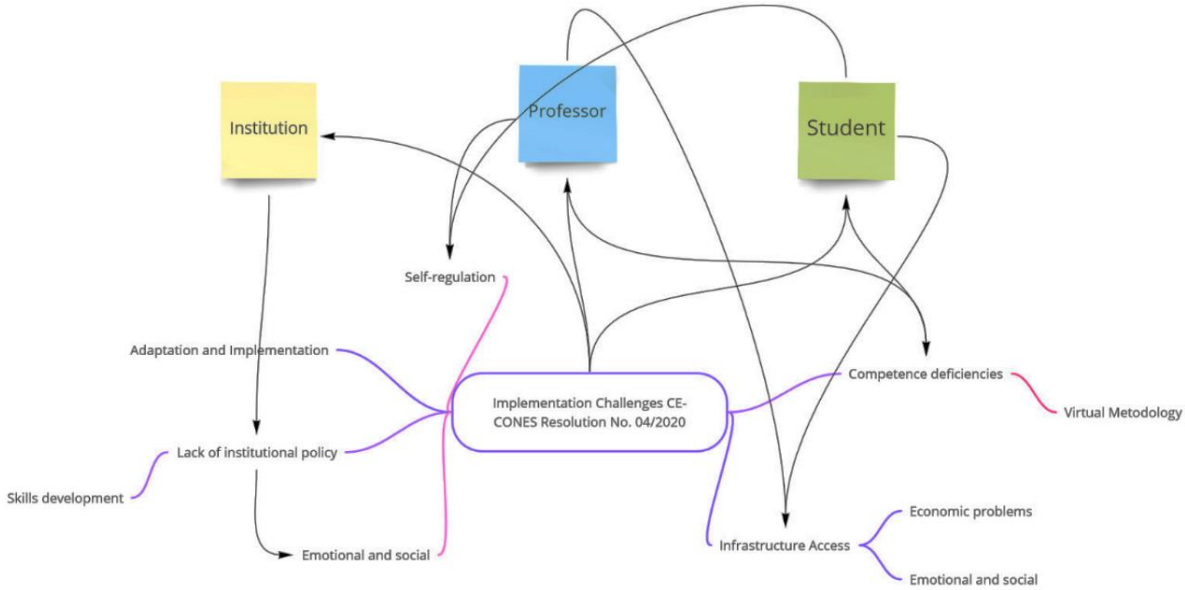
The critical situation of most of the students enrolled in the different higher education programs was that they work between 8 and 12 hours a day to finance their studies. During the pandemic there were many job losses and many students depended on the financial support of relatives, which made it impossible to buy equipment, as well as Internet data packages. The economic factor led to dropouts, as well as to the difficulty of managing and making effective times for work and study, which eventually implied desertions. Finally, three factors were repeatedly mentioned: the economic problem, both for teachers and students, related to the high cost of the Internet, the reduction of salaries, and the loss of work, among other aspects. In this respect, a participant mentioned “what had the greatest impact is that most of the students have been left without work” or “another element that had an impact and that was discouraging was

the lack that Paraguay still has of culturalization with respect to the use of technologies as a fundamental tool of support for study".

This set of situations can be more clearly seen in the conceptual map of Figure 1, where the links and coincidences of influences of the categories between actors are highlighted. The institution is responsible for establishing educational norms and policies, following the guidelines of other higher governmental bodies, while teachers and students affiliated to it must respond to these indications, adapting their activities and practices according to their available resources and professional and academic competences.

FIGURE 1

Conceptual map of the main challenges that institutions have faced from the COVID-19 pandemic to October 2021 to apply digital teaching and learning tools.



NOTE: Figure 1 shows the scheme of actors and the distribution by type of common problems that represented challenges for the application of virtual education during the COVID-19 pandemic between the years 2020 and 2021 in higher education institutions of Paraguay (2021).

SOURCE: Prepared by the authors.

4. Discussion and conclusion

4.1. *Discussion*

This approach to teachers' experiences from different higher education institutions in Paraguay in the context of the accelerated implementation of a completely on-line learning education has provided an understanding of which topics and areas are of greater importance, in which efforts must be made to sustain this pedagogical form of teaching and learning, such as blended, flipped and hybrid (BFH) approaches (Meyer *et al*., 2007; Saichaie, 2020). Accordingly, Bates (2020b, 2021) stated, with respect to post-COVID-19 higher education, that there are important trends to be consolidated in order to achieve integration of digital methodologies in face-to-face teaching (blended

learning) and to increase more flexible delivery methods to the extent required by lifelong learners (Grau-Perejoan, 2008), as some participants agreed. On the other hand, it was evident that higher education institutions depend on the context of national educational policies when addressing the application of the on-line learning modality. This has strengthened practices and there is an opportunity to offer more specialized and efficient educational services, as recommended by García Peñalvo (2007), by establishing a clearly defined strategic model and an adequate policy in relation to on-line learning. This includes the implementation and sustainability of mediated education with technologies (Quintana & Aparicio, 2017) and support for accreditation and homologation systems of undergraduate and postgraduate curricula involving mixed or virtual teaching modalities (CONES, 2016; SITEAL, 2019).

Good digital access is a very important factor to offer good quality on-line learning or BHF education (Barnett, 1990; Chamorro Cristaldo, 2018; ITU, 2022; UNESCO, 2021), which coincides with the participants' reported problems, calling for strategic public policies of education (CEPAL & OREALC, 2020; Laurillard, 2008; Moreno Bau, 2021; UNESCO, 2021) as well as competitiveness and the improvement of quality in terms of access to equipment, energy, and connectivity services in order to be able to give a better response within the context of the asymmetries of the institutional and personal budgets of the actors. Accordingly, we seek to provide access to an adequate infrastructure enabling work with digital technologies (Gu, 2021; Sánchez *et al*., 2017; Sanchez-Prieto *et al*., 2020).

All the investment and dedication of the actors to implement, strengthen and develop new digital and pedagogical skills have provided future capacities for the institutions themselves. This is especially true in relation to teaching practice, such as the integral teaching competence in the digital world (Esteve *et al*., 2018). At a methodological level, this change of environment permitted the characterization of teachers' practices through the modification of the planning in instructional design contexts, and in their culture subjects (Castañeda *et al*., 2021), and on-line learning let them incorporate constructionism and meaningful education practices (Fuertes-Alpiste, 2020a; García-Peñalvo, 2020; Santos & Schlünzen, 2017; Wandler & Imbriale, 2017). As for the challenge of each student or teacher who wishes to take advantage of technology-mediated education to achieve academic-professional development (Fuertes-Alpiste, 2020b; INTEF, 2017), at the beginning of the application of this modality a large part of the actors had not yet developed basic skills of digital pedagogy, of creation of digital resources, or of evaluation based on user experience and feedback mediated by technologies (Cabero-Almenara *et al*., 2020; Fournier & Kop, 2015; Londoño, 2011). For the educator, this factor must be kept in mind to promote an instructional design that prioritizes the autonomy and self-regulation of students (Delgado-Vera *et al*., 2018), adapting to the new modality and transforming the practice of teaching.

The application of these methodologies in the context of the emergency forced the institutions to begin to work on the establishment of new policies for the implementation of technologies, although the time of implementation and the time of adoption were not immediate in some cases, as they require the establishment of mechanisms of support for professors, civil servants, and students (Del Arco *et al*., 2021). The actors are the key factor: they are the ones who will be empowered or abandoned in the future. This is the value proposition so we would like to reach out more closely

and with a greater number of individuals within the context of each institution with its own culture, idiosyncrasy, and institutional policy, as well as attending to the future projection of its members. All the difficulties relating to socioeconomic issues were addressed from the sociocultural perspective of professors and students (Colás Bravo *et al*., 2005), on the intra-psychological plane (individual internal plane), and the emotional situation emerged from the required self-regulation and the requirements of the academic programs (Infante-Villagrán *et al*., 2021; Inzlicht *et al*., 2021; Iqbal *et al*., 2021; Stephen & Rockinson-Szapkiw, 2021).

4.2. *Conclusion*

From these challenges addressed during the pandemic on implementing the fully virtualized remote modality, it was possible to appreciate the efforts of the actors to adopt and implement on-line education as required by the health situation, through self-regulation and the development of their competence capacities, and through the resilience shown by these actors in their efforts to remedy their competence deficiencies and to investigate, experiment and collaborate despite the deficiencies of infrastructure at the national level due to institutional budgetary issues and economic and social crises. This indirectly affected performance and the increase in dropouts due to their not being able to improve their access conditions. Similarly, this set of situations had emotional effects, which discouraged both teachers and students in the exercise of the practice of teaching and learning by digital means. Those institutions that had a lagging response to what is implied by a change of modality produced disorientation and a perception of disinterest on the part of teachers and students. However, those that implemented palliative measures providing flexibility, consideration, and support by offering data packages, training, and reductions in the fees of educational services maintained the interest and commitment of students and teachers.

The objective of evaluating the impact of the implementation of online learning in Paraguayan higher education adopted in an emergency context and its sustainability, from the point of view of teachers, has allowed us to identify milestones in their experience, especially for the foundation and continuity of research in this area, as well as for decision-making at the level of institutional policies. This ERT implementation incorporated noteworthy features of its actors' culture, the appropriation of the problem and the resilience of its actors, whom at first saw it as temporary but in the long run adopted much more lasting responses and advanced in their context, offering solutions for self-regulation of activities, development of digital skills and strengthening of existing skills. In the second semester, both teachers and students showed a greater acceptance of the modality, and they now consider that they will continue to use digital tools both at the level of academic management and in the performance of their work inside the classroom. On the other hand, at the institutional and national policy level, educational services and equipment supply services, electricity, and Internet data packages are services that must be improved to support this teaching modality as an enabling infrastructure. Regardless of institutional budgets, we saw efforts to alleviate the economic and social crises, both from higher education institutions and from the educational community, who made investments and efforts to improve conditions which also indirectly affected the emotional situation of the players involved, and this

should not be ignored as an exhausting situation due to the context in which it was implemented.

As CONES (2016) accredits and enables distance and blended education at the request of Paraguayan institutions, some interviewees stated that it is currently possible to implement new higher education methodologies and improve the academic offer for students and professors in all fields of knowledge. Also, the two years of experience allow a rethinking of the regulatory reform in terms of extending the offer of distance and blended studies to foreign countries. Similarly, the professors that work for universities can take advantage of the integration of digital and face-to-face teaching (blended learning) (Bates, 2021), applying new teaching methodologies or education-mediated technologies for face-to-face studies based on constructionism and connectivism practices. Even students can now support their knowledge process using technologies and applications that allow them to carry out better projects and activities using several tools to collaborate with partners and teachers (Britez, 2020; Cardozo *et al*., 2021). All these systems of teaching and learning must be strengthened with the integration of a constant digital skills development program regardless of the existence or not of an emergency for its application (Castañeda *et al*., 2021).

4.3. *Limitations*

To probe deeper into the results of this qualitative research, a larger sample would allow a better comparison and a strengthening of the consistency of perception of the actors involved in the context of Paraguayan higher education. This limitation opens the possibility of applying new research methods to this research, allowing greater coherence, inclusion and trustworthiness using empirical or mixed methods, increasing the sample size in each of the participating institutions, now that the pandemic is evolving, with an improvement of interactions in a less conductive way. All this can allow a better comprehension of the need to support this model of education with the aim of offering significant information and understanding for actors with the necessary political will to sustain this form of teaching.

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