

Artículos Originales

## ICT access during the COVID-19 pandemic in Paraguay: Educational actors' perspectives

### Acceso a las TIC durante la pandemia del COVID-19 en Paraguay: Perspectivas de los Actores Educativos

Valentina Canese<sup>1,2</sup>, Juan Mereles<sup>1</sup>, Jessica Amarilla<sup>1</sup>

<sup>1</sup>Universidad Nacional de Asunción, Paraguay.

<sup>2</sup>E-mail: vcanese@fil.una.py

#### Abstract

This article presents the main issues related to ICT access for educational actors (students, teachers and parents) in relation to the measures adopted by the government to address the COVID-19 pandemic. The purpose of this study is to examine their access to ICT at the moment of starting the interruption of the usual school activities due to the COVID-19. The participants included 505 parents of school children and youth from the pre-school to secondary, 1030 teachers from all educational levels and 856 students from secondary school and higher education at public, private and subsidized institutions throughout the country. For data collection, online questionnaires with closed-ended and open-ended questions were used, administered through different digital channels at the beginning of the confinement. Results show that up to 5% of the participants do not have cell phones and up to 31% do not have access to a computer to carry out the educational process without interruptions. Access to the Internet is restricted outside of the capital and its metropolitan area since limited data packages are used, which in turn prevent, in many cases, the adequate development of academic activities (48% of students, 40% of teachers and 51% of parents have limited connection). The most widely used medium for this purpose is the WhatsApp messaging app, especially at the non-university educational levels. This study shows that there are still educational actors, most from the interior of the country, whose access to the technological resources needed to carry out educational tasks during the pandemic is very limited and their connectivity restricted. The results of this study call on educational authorities to consider these factors when making decisions regarding the implementation of educational policies that require access to technology.

*Keywords:* ICT, access, educational stakeholders, pandemic, COVID-19.

#### Resumen

En este artículo se presentan las principales cuestiones relacionadas con el acceso a las TIC por parte de los agentes educativos (estudiantes, profesores y padres) en relación con las medidas adoptadas por el gobierno para hacer frente a la pandemia de COVID-19. El propósito de este estudio es examinar su acceso a las TIC en el momento de iniciar la interrupción de las actividades escolares habituales debido a la pandemia de la COVID-19. Entre los participantes se encontraban 505 padres de niños y jóvenes en edad escolar desde el preescolar hasta la secundaria, 1030 profesores de todos los niveles educativos y 856 estudiantes de secundaria y de enseñanza superior en instituciones públicas, privadas y subvencionadas de todo el país. Para la recolección de datos se utilizaron cuestionarios en línea con preguntas cerradas y abiertas, administrados a través de diferentes canales digitales al comienzo de la reclusión. Los resultados muestran que hasta el 5% de los participantes no tienen teléfonos celulares y hasta el 31% no tienen acceso a una computadora para llevar a cabo el proceso educativo sin interrupciones. El acceso a Internet es restringido fuera de la capital y su área metropolitana, ya que se utilizan paquetes de datos limitados, que a su vez impiden, en muchos casos, el desarrollo adecuado de las actividades académicas (el 48% de los estudiantes, el 40% de los profesores y el 51% de los padres tienen una conexión limitada). El medio más utilizado para este fin es la aplicación de mensajería WhatsApp, especialmente en los niveles educativos no universitarios. Este estudio muestra que aún existen actores educativos, la mayoría del interior del país, cuyo acceso a los recursos tecnológicos necesarios para llevar a cabo las tareas educativas durante la pandemia es muy limitado y su conectividad restringida. Los resultados de este estudio llaman a las autoridades educativas a considerar estos factores cuando tomen decisiones sobre la implementación de políticas educativas que requieran el acceso a la tecnología.

*Palabras clave:* TIC, acceso, actores educativos, pandemia, COVID-19.

Recibido: 8/12/2020

Aceptado: 20/01/2021



Due to the pandemic caused by the new COVID-19 virus, governments around the world have taken extreme measures to mitigate the spread of the virus and prevent the collapse of health systems, especially in countries where there is not enough health infrastructure for such an emergency. The pandemic has affected all aspects of daily life, including the economic and health systems, and the education systems around the world as educational activities have been disrupted at all levels for about 80% of students worldwide (Chang and Yano, 2020; World Bank, 2020). In Paraguay, classes were suspended on March 10 to prevent the spread of the virus (Britez, 2020). The Ministry of Education and Science (MEC) was forced to develop an educational plan following the UNESCO guidelines (2020) called "Your School at Home". This plan includes aspects such as the preparation and relevance of the system, ensuring inclusive education in distance learning and providing technical assistance to students and teachers, among other guidelines. The plan includes an analysis of the means available to students and teachers such as the use of cell phones, the content provided through the official MEC website (<https://aprendizaje.mec.edu.py/aprendizaje/>) and other media, as well as the distribution of printed materials, classes through TV, radio and newspapers (MEC, 2020).

According to recent presentations by Reimers and Schleicher (2020), in countries where face-to-face classes were cancelled, educational institutions have been encouraged to continue academic activities through online learning, mediated by technology, or by mass media such as television as was done in Paraguay. Teacher training became a priority to guide the teaching-learning process through digital media. However, the interruption of face-to-face activities presents numerous challenges that include loss of learning, insufficient teacher training in the use of ICT, differences in access to technology, school dropouts, lack of food aid, and poor preparation of parents to help their children, among others, which can have long-term effects on the academic performance and future job opportunities of students (Bertram and Gilliland, 2003; Fox, 2004; Muñoz-Miralles et al, 2014; Uscher-Pines et al., 2018; Sanz, Sáinz González and Capilla, 2020).

In Latin America, although some (who) see this situation as an opportunity for digitalization (Almazán, 2020) and for creating links between families and schools (Muñoz and Molins, 2020), the challenges have been particularly evident due to the conditions of inequality presented by the educational systems (CEPAL, 2020; Cifuentes-Faura, 2020; Monasterio y Briceño, 2020; Álvarez et al, 2020). This becomes more evident in vulnerable populations such as indigenous people and people with disabilities (Gallardo Gutiérrez, 2020; Moreno-Rodríguez, 2020). One of the most important aspects for technology-driven education relates to the access that educational actors have to technology. It is of utmost importance to understand how the educational community is addressing the challenges presented by COVID-19 through the different technological resources and the way to access them. Therefore, the main purpose of this study was to analyze the accessibility to Information and Communication Technologies (ICT) of the different educational actors: teachers, parents and students in Paraguay during the first weeks of the pandemic in order to give continuity to the educational process.

## **METHODOLOGY**

A quan-qual approach was used in the study using questionnaires including closed and open-ended questions as well as follow-up focus group interviews. The sample included an adjusted total of 2391 participants with a 95% confidence level and an error equal to 0.02. The distribution of the sample was as follows: 1030 teachers of all educational levels, 856 high school and university students, and 505 parents of children and young people from kindergarten to the third year of high school of public, private and subsidized educational institutions

throughout the country. The data were collected using closed-ended and open-ended questionnaires adapted from Wozney, Venkatesh, and Abrami (2006) and validated internally. These questionnaires included 30 to 37 questions related to personal characteristics and areas of residence, access to different technological resources, sending and receiving academic activities, and problems or difficulties encountered in the academic process carried out remotely because of the COVID-19 pandemic.

The data collection period lasted 4 weeks, starting from the first weeks of the beginning of the quarantine. During this period, the questionnaires were distributed through different digital media such as email, messaging and social networks (WhatsApp and Facebook). The data gathered included quantitative results from the closed-ended questions, as well as qualitative data resulted from the open-ended questions as well as the follow-up interviews. This article presents the results of the quantitative data focusing on the technology accessibility questions. There was a high participation of the three educational actors mainly from the Central Department and the Capital of the country and in smaller proportions from the rest of the country. Data analysis programs such as R, SPSS and Excel were used to summarize the information through descriptive graphics and statistical tables.

## RESULTS

The responses showcase a significant evidence of ownership of cell phones with some kind of internet service. Between 95% and 99% of the participants indicated having at least one smartphone in their home (Table 1). In this sense, the lowest number corresponds to the parents (95%). However, it is important to notice that 18% of parents and 5% of students highlighted that although they do have a cell phone, in many cases it is shared with other members of the household specially as academic activities are sent by educational institutions to continue with the educational process.

On the other hand, the ownership of computers at home was less than that of cell phones with all educational actors. Once again, parents are the ones who expressed, in greater proportion, having limited access to this technological resource, which is extremely important for the completion of many school tasks (Table 1). High percentages of participants, who have computers, also indicated that the use of this technological tool is shared with other members of the household. In the same way, 52% of the teachers expressed having a single computer for the whole family. On the other hand, 49% of parents and 41% of students, who have a computer, said that the use of it was being shared with other members of the household who were also confined by the health crisis.

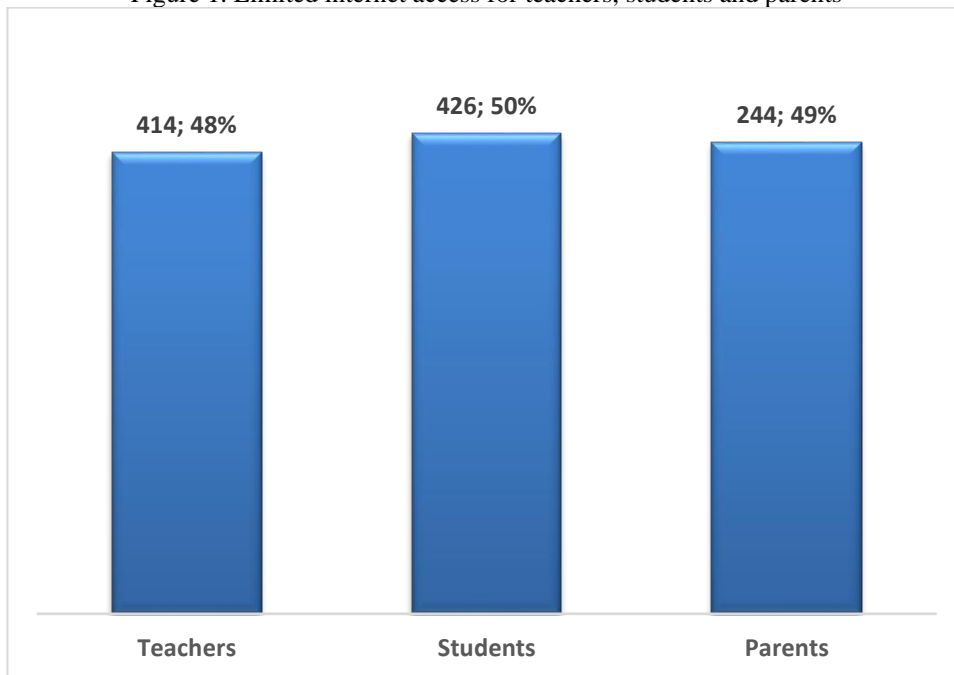
Table 1. Cell phone and computer ownership

	Cellular phone		Computer	
	Recount	%	Recount	%
Teachers	1016	99	949	93
Students	852	99	639	75
Parents	457	95	334	69

With respect to Internet access, high percentages of teachers, parents and students, about 50% of each educational actor, expressed limited access to this essential resource for sharing online information related to school issues (Figure 1). Although access to certain resources such as the WhatsApp messaging service is incorporated in many plans or data packages of most telephone companies, it should be noted that there are restrictions for other academic activities such as the use of YouTube or other sites that are not included for free in data plans.



Figure 1. Limited internet access for teachers, students and parents



The limited Internet connection was observed in significantly greater proportion in all areas of the country except Asunción and the Central Department ( $\chi^2=297.3$ ,  $p<0.001$ ). This may be because the availability of Internet networks is affected by the geographic location or socioeconomic characteristics of these departments. In Asunción and the Central department, teachers, students and parents responded mostly to having an unlimited connection to the Internet. However, the opposite was true in the rest of the country, with students being the most affected. In this sense, 76% of them indicated to have limited access to the internet (Table 2). The change in Internet accessibility, from unlimited to limited, is very large comparing the two most important areas of the country with the rest of the departments. This reaffirms the existence of an important gap.

Table 2. Access to internet according to area of residence for teachers, parents and students

	Asunción		Central		Rest of the Country	
	Unlimited	Limited	Unlimited	Limitado	Unlimited	Limited
Teachers	205	73	234	110	171	231
Students	198	66	136	94	86	266
Parents	104	40	78	52	74	152

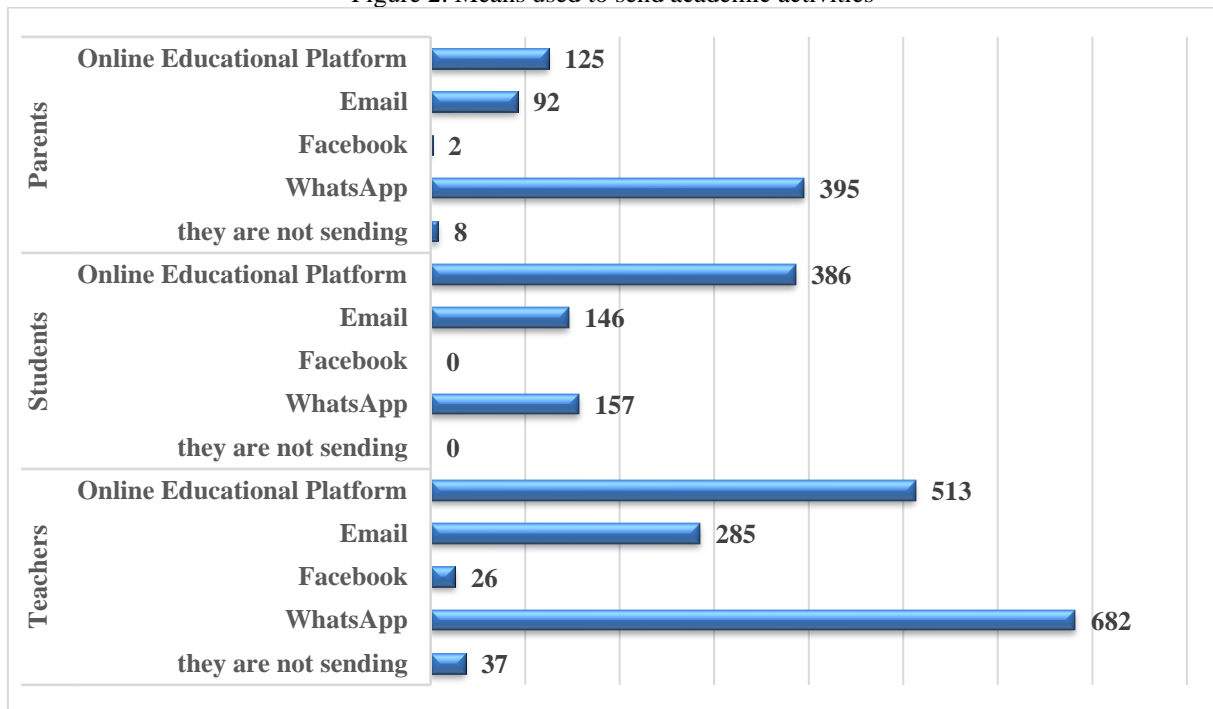
Regarding access computers at home, and the type of internet connectivity, discriminated by student educational level and by educational level taught by teachers, the data shows that there is a higher level of computer ownership in higher education students' homes. However, limited connection to the internet was evidenced at a higher rate within this educational level, with statistically significant differences as shown in table 3. Likewise, higher education teachers expressed a higher rate of computer ownership as well as higher levels of unlimited internet at home. This may be due to the different activities that teachers at different levels perform, as higher education instructors generally require more access to the internet and computers than teachers at the beginning levels of education.

Table 3. Access to computers and type of connection according to educational level (%)

<b>Teachers</b>							
	<b>Pre-K through grade 3</b>	<b>Grades 4-9</b>	<b>High- school (grades 10-12)</b>	<b>Higher Education</b>	<b>Total</b>	<b>Chi</b>	<b>P value</b>
<b>Computer ownership</b>							
At least one computer	5,7	4,6	21,5	68,2	100		
Shared with other members of the home	13,4	7,8	25,2	53,5	100	119,7	<0,001
Does not own a computer or does not have access to one	40,0	21,5	32,3	6,2	100		
<b>Internet connection type</b>							
Unlimited	9,7	6,7	21,9	61,7	100	60,3	<0,001
Limited	18,5	10,0	34,9	36,7	100		
<b>Students</b>							
	<b>High- school (grades 10-12)</b>	<b>Higher Education</b>	<b>Total</b>	<b>Chi</b>	<b>P value</b>		
<b>Computer ownership</b>							
At least one computer	20,6	79,4	100				
Shared with other members of the home	28,3	71,7	100	6,25	0,04		
Does not own a computer or does not have access to one	27,6	72,4	100				
<b>Internet connection type</b>							
Unlimited	28,8	71,2	100	8,51	0,003		
Limited	20,2	79,8	100				

In regards to the assignment and the sending of academic activities, results show that these were sent by different digital media such as the messaging service WhatsApp, digital educational platforms (Moodle, Canva, Google Classroom, among others), email to parents and students and the social network Facebook. Results show that WhatsApp and the digital educational platforms are the most used by the educational actors. The first channel is widely preferred by teachers and parents of students in elementary and high school level. This channel is used mainly because it is easily accessible via cell phone (Lloyd, 2020). On the other hand, university students in greater proportion indicated that they use digital educational platforms for the assignment of different academic activities proposed by teachers (Figure 2). This is because most higher education institutions have digital learning platforms adapted for this purpose.

Figure 2. Means used to send academic activities



The former part is not a finding from the research. It is a characteristic of the informants. I would exclude it from the article.

On the other hand, both parents and students mentioned that reading materials are the predominant teaching resources used by teachers; this was mentioned by 78% and 46% respectively. There are other resources that teachers also use such as PowerPoint presentations, YouTube videos, educational websites, interactive materials, videoconferencing and chats or instant messaging. Among these resources, videoconferences stood out, mentioned in a higher proportion by students (33%). For the latter, a good Internet connection is required and a smart cell phone is needed to adequately follow up on what the teacher poses in the corresponding virtual space, be it for communication or explanation of content (Table 4).

Table 4. Resources used by teachers according to students and parents and educational level?

Teaching materials or resources	Students		Parents	
	Recount	%	Recount	%
Reading material (printed, PDF, DOC)	397	46,4	395	78,2
Presentations in Powerpoint, Prezi, etc.	296	34,6	61	12,1
Videos (YouTube, etc.)	285	33,3	175	34,7
Websites	108	12,6	78	15,4
Interactive Materials	43	5	84	16,6
Videoconferencing	283	33,1	38	7,5
Chats or instant messaging	115	13,4	86	17

## DISCUSSION

In the context of the COVID-19 pandemic, education has undergone "the most rapid pedagogical and assessment transformation ever seen" (Brammer y Clark, 2020, p. 454). Such changes were made to mitigate the negative effects of the pandemic such as loss of learning and

diminished economic opportunities for students (World Bank Education, 2020) as well as social and economic gaps in access to technology (Alvarez et al., 2020; Alvarez Marinelli et al., 2020; Armitage y Nellums, 2020; Esposito y Principi, 2020; Li y Lalani, 2020; Lloyd, 2020; Vivanco-Saraguro, 2020). The results of this study show one of the main difficulties presented to educational actors, that of access to technology and connectivity.

Although it is indicated that most of them have a cell phone for educational activities or, in the case of parents, for communication with teachers, it is important to highlight the lower level of computer ownership, especially in the case of parents and students, and how this could affect the educational process. Technological equipment along with the knowledge necessary for its use are essential for the continuity of education and these should be accessible to all families (Almazán, 2020). Similarly, personal space available for studying is also important as this affects online learning (Bhaumik y Priyadarshini, 2020). Considering the unprecedented times, the role of the teacher has been decisive in light of the measures taken for the continuation of education remotely (Hincapié, 2020). However, the lack of access to certain technological tools could represent an obstacle for the realization of academic tasks and the education of students. Other studies indicate that teachers face difficulties in terms of lack of access to technological tools, content adaptation, in addition to increased workload and working from home (Sánchez Mendiola et al., 2020; Johnson, Veletsianos y Seaman, 2020).

It is important to emphasize that educational actors who are in the interior of the country present more difficulties since this could be related to the lack of internet connection, cost and access to ICTs. Considering this issue, there is a need for more training in the use of ICTs to "develop not only knowledge but also skills in the use of ICTs." (Picón, Caballero y Paredes, 2020; p. 12) Nevertheless, the current situation leads to hasty decisions, which makes it difficult to design remote classes when they should be face to face, especially if the aim is to maximize the benefits and decrease the limitations of remote education (Dunlap, Verma y Johnson, 2016). Thus, the reality of each student and teacher adds to these barriers as remote teaching and learning implies balancing tasks, having a space free of distractions and above all having the necessary tools and stable internet to carry out educational work (Monasterio y Briceño, 2020; Zhang et al., 2020). However, this is not reflected in the reality of many educational actors.

## **CONCLUSION**

The abrupt interruption of the educational process in the Classroom-based modality and the need to continue education through different technological tools presupposes that the different educational actors must have accessibility to these resources or at least to a great part of them. In this way, it is expected to have the greatest possible participation and reduce student dropout. From the results presented in this study, some important characteristics about access to ICTs by parents, teachers and students during the first weeks of compulsory confinement for health reasons caused by COVID-19 in Paraguay are highlighted. Results showcase the access to resources such as cell phones that is widespread in much of society (DGEEC, 2018) and also the limited availability of computers in the homes of educational actors. The latter forces educational facilitators to seek educational strategies in order to reach a large part of the most vulnerable sectors. Another aspect found in this study is the limited connectivity to the Internet of all educational actors, especially, and in greater proportion, in departments outside the country's capital and the Central Department. This represents, in a way, a restriction to the desire of these sectors of society to continue with the educational process in an integral and decent manner. In the long term, this digital divide could become an educational gap (Sunkel and Trucco, 2010; Lloyd, 2020) if the necessary political measures are not taken.

For this reason, it is important to realize that educational technology is not neutral, since it cannot function on its own, and its expansive and empowering uses must be manipulated to



reach its potential (Selwyn, 2010; Cobo, 2016). In order to face extreme situations such as the one presented by the COVID-19, governments and educational systems must focus not only on providing the necessary access to technology, but also on empowering the entire educational community with active leadership (Schleicher, 2020a; Schleicher, 2020b) and by creating affective spaces for coexistence and learning (Cáceres-Piñaloza, 2020) considering social inclusion and the reality of the entire educational community.

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