Changes in educational adaptation during the covid-19 pandemic in Paraguay, 2020-2021

Cambios en la adaptación educativa durante la pandemia de covid-19 en Paraguay, 2020-2021

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ABSTRACT

During the years 2020 and 2021, global education was significantly impacted by the COVID-19 pandemic. The sudden change in educational modality caused the different actors to adapt at breakneck speed and with the often-limited resources available to them. The present study aims to show and analyze the educational changes that have occurred during the last two years in Paraguay through the statements collected from three actors directly involved in the teaching-learning process: teachers, high school and university students, and parents of school-age children from different parts of the country. The data collection was carried out in three different phases: Mar-May 2020, Nov-Dec 2020 and Nov-Dec 2021. The results show significant changes in terms of access to technological tools such as computers and internet and demonstrate high proportions of actors who used WhatsApp and educational platforms as the main channels of communication and sending homework. In addition, they highlight the reading of materials and worksheets as those activities mostly proposed during the two years. The results also revealed significant difficulties related to internet connectivity, lack of understanding of tasks, motivational aspects, and lack of time for adequate dedication to the activities proposed. Nevertheless, several stakeholders highlighted that the educational modality implemented was of interest to them due to certain advantages that could be taken advantage of and improved in a normal educational system.

Keywords: Adaptation; Educational actors; TIC; Pandemic; Paraguay.

RESUMEN

Durante los años 2020 y 2021, la educación mundial se vio considerablemente afectada por la pandemia del COVID-19. El repentino cambio en la modalidad educativa hizo que los diferentes actores se adaptaran a una velocidad vertiginosa y con los recursos, muchas veces limitados, de que disponían. El presente estudio pretende mostrar y analizar los cambios educativos ocurridos en los últimos dos años en Paraguay a través de las declaraciones recogidas de tres actores directamente implicados en el proceso de enseñanza-aprendizaje: profesores, estudiantes de secundaria y universidad y padres de niños en edad escolar de diferentes partes del país. La recolección de datos se realizó en tres fases diferentes: marzo-mayo de 2020, noviembre-diciembre de 2020 y noviembre-diciembre de 2021. Los resultados muestran cambios significativos en cuanto al acceso a herramientas tecnológicas como ordenadores e internet y demuestran altas proporciones de actores que utilizaron WhatsApp y plataformas educativas como principales canales de comunicación y envío de tareas. Además, destacan la lectura de materiales y hojas de trabajo como aquellas actividades mayormente propuestas durante los dos años. Los resultados también revelaron importantes dificultades relacionadas con la conectividad a Internet, la falta de comprensión de las tareas, los aspectos motivacionales y la falta de tiempo para una adecuada dedicación a las actividades propuestas. No obstante, varios actores destacaron que la modalidad educativa implementada era de su interés debido a ciertas ventajas que podrían ser aprovechadas y mejoradas en un sistema educativo normal.

Palabras Clave: Adaptación; Actores educativos; TIC; Pandemia; Paraguay.

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1. Introduction

During the years 2020 and 2021 the educational process as we know it was affected by the COVID-19 pandemic. Around the world, schools, colleges and universities were forced to migrate face-to-face classes to remote systems to ensure the continuity of the educational process. It is estimated that in Latin America, approximately 160 million students stopped having face-to-face classes (ECLAC, 2020). This situation was due to the confinement measures to prevent the spread of COVID-19. These decisions will have important consequences for the development of the region and will require measures to ameliorate the effects of the pandemic. The ministries of education in several countries implemented diverse measures to ensure educational access, especially through technological platforms (Bozkurt and Sharma, 2020; Condor-Herrera, 2020). However, the establishment of remote classes as the only alternative represented challenges and opportunities for educational actors in all areas.

The technology mediated side of this remote system is referred to as emergency remote teaching (ERT) as this modality differs from traditional remote education. Due to the urgency of the situation, ERT provides a quick and practical solution to provide continuity of education in times of crisis (Hodges et al., 2020). That is, traditional remote education requires more complex design and planning which results in a more robust system. This distinction is very important as this relates to the difficulties and opportunities previously mentioned. Remote education offers a myriad of tools for classroom development. For example, software and learning management systems (LMS) along with applications have gained prominence during the pandemic. Among the most widely used are WhatsApp (Moreno and Lluch, 2020) as well as Zoom, MOODLE, and Microsoft Teams (Gómez-Hurtado et al., 2020). Similarly, orchestrated efforts made by governments in order to decrease the technology gap resulted in the implementation of television and radio programs to broadcast lessons and share educational resources (Pozo-Sánchez et al., 2020).

Research indicates that educational actors experienced technological difficulties (Sintema, 2020; Trujillo et al., 2020). In his literature review, Perdomo (2022) indicates that among the most common barriers, difficulties related to infrastructure (equipment and connectivity) and personal barriers (mainly stress and anxiety) were identified. The difficulties consist of lack of stable internet connection, lack of infrastructure and lack of knowledge to handle technological tools. Although difficulties affect all educational actors, they tend to be more common in rural areas or more vulnerable communities (Di Prieto et al., 2020; Tiruneh, 2020). However, despite the aforementioned difficulties, the arrival of the pandemic allowed educational actors to develop knowledge on ICT management and establish collaborations for the better development of classes. Also, technology allows the use of different platforms and teaching methods benefiting students with different needs and learning rhythms (Vallejos and Guevara, 2021).

The education context during the pandemic in Paraguay was no different from around the world. For example, Paraguay took the necessary measures to stop the spread of the virus in light of its arrival to the country (Mereles et al., 2020). The Ministry of Education and Science approved school closure from March onwards and provided alternative ways for students to have access to their classes, e.g.: online platform with resources for teachers, parents, and students; and radio and TV broadcast of lessons for K-12 students (MEC, 2020). This resulted in the mass implementation and use of technological tools at all levels of schooling (Canese et al., 2022). Similarly, the higher education sector adopted a fully remote modality to ensure the continuity of the academic year (CONES, 2020). The main objective of this study is to describe the changes that occurred in the adaptation of the different educational actors in Paraguay with respect to emergency remote teaching caused by the COVID-19 pandemic. In addition, it is intended to show the accessibility to technological resources that were available during the two intense years that the classes lasted under this educational modality.

2. Methodology

The study focused on teachers who are teaching at different educational levels, high school and university students (undergraduate and graduate) and parents of school-age children in public and private educational institutions throughout Paraguay.

Data collection was carried out during three periods or phases. The first period covered the first months of migration to virtuality (from March to May 2020), the second period was carried out in November and December of the same year, while the third and last period also covered the last two months, but in 2021. The distribution of participants in the three periods is shown in Table 1.

Table 1. Distribution of the number of participants by sampling periods.

Educational stakeholders	**Sampling periods**			
	Mar-May/2020	Nov-Dec/2020	Nov-Dec/2021	Total
Teachers	1030	299	132	1461
Students	856	308	61	1225
Parents	505	202	70	777
Total	2391	809	263	

Own source.

Electronic questionnaires administered through the Google Forms application and distributed through digital media (WhatApp and e-mail) were used. These questionnaires contemplated characteristic and particular features of teachers, students and parents of non-university students, as well as common elements integrated during the development of emergency virtual education (socio-demographic data, access to information and communication technologies, communication channels used, educational materials or resources used, types of activities developed, ICT training, difficulties, challenges and opportunities, among others). These aspects were collected through closed and open-ended questions. The open-ended answers were mainly oriented to collect information on the challenges and opportunities seen during the teaching-learning process and the general perception of remote emergency education.

The questionnaires used in this study were adapted to the reality of the situation, but following the approach proposed by Wozney et al. (2006), on the use of ICT in education. This questionnaire has five sections that include professional perspectives on the use of technology, teaching experience and style, experience with technology, integration process, and additional comments. The questionnaires underwent a validation process by experts considering the purpose of the study and the applicability to the Paraguayan context prior to their application.

With the intention of analyzing the changes that occurred in the different educational aspects during the two years that the emergency virtual classes lasted, proportion comparison tests were used. These tests use the chi-square distribution as a probability model to make the comparisons. In the first instance, it is verified whether the existing differences are statistically significant (overall test). Subsequently, if the result of the overall test reports significant changes, post hoc proportion comparison tests are used considering the Holm adjustment to detect between which proportions, and therefore groups, there are differences. The comparisons are one-way, that is, we try to find out whether the increase or decrease in proportions is large enough. A significance level of 0.05 was set. Comparisons that are accompanied by a $p<0.001$ indicate that the discrepancies are "highly significant". All quantitative analyses were performed using various functions and some packages of the R software, which is free and open source.

3. Results

Table 2 shows how the computer ownership of the different educational actors changed during the two years of emergency remote education due to the Covid-19 pandemic. The overall distribution indicates that about 85% of all educational stakeholders reported having at least one computer at home. However, discrimination by stakeholder reveals that the percentage of teachers (94.3%) with this possession was higher than that of students (78.8%) and parents (78.3%), at least in an exploratory sense. However, the a posteriori test for proportions shows that only the percentage of teachers was higher than that of students ($p<0.001$). If the evolution for each educational actor is appreciated, the percentages of all of them regarding the possession of at least one computer at home were higher in the last two months of the years 2020 and 2021 compared to that reported in the first months of virtual classes. These increases turned out to be statistically significant ($p=0.002$ and $p=0.007$ for teachers; $p<0.001$ and $p=0.004$ for students; $p<0.001$ and $p<0.001$ for parents). Between the answers given in Nov-Dec/2020 and Nov-Dec/2021, for all educational actors, no significant changes were found. These results confirm that many Paraguayan families had to acquire this technological tool to partially cope with educational activities during remote classes during the pandemic.

Table 2. Distribution of educational stakeholders according to computer ownership in the home.

	At least 1 computer	None	Total
Teachers	**94,3%**	**5,7%**	**100%**
Mar-May/2020	92,6%	7,4%	100%
Nov-Dec/2020	98,0%	2,0%	100%
Nov-Dec/2021	99,2%	0,8%	100%
Students	**78,8%**	**21,2%**	**100%**
Mar-May/2020	74,6%	25,4%	100%
Nov-Dec/2020	87,7%	12,3%	100%
Nov-Dec/2021	91,8%	8,2%	100%
Parents	**78,3%**	**21,7%**	**100%**
Mar-May/2020	69,1%	30,9%	100%
Nov-Dec/2020	95,5%	4,5%	100%
Nov-Dec/2021	94,3%	5,7%	100%
Total	**85,2%**	**14,8%**	**100%**

Own source.

Another aspect that was also relevant during the pandemic was the type of Internet connection available, since more varied activities can be carried out without fear of consuming all the Internet data if the Internet is unlimited. In this line, the results show (Table 3), in general, a mostly unlimited type of connection (58.4%; $p<0.001$). When analyzing the type of internet connection marginally by actor, teachers and parents responded more frequently to having an unlimited internet connection with respect to students ($p<0.001$ and $p=0.045$ respectively). The percentages of the three educational actors with unlimited internet connection increased significantly in the last two sampling moments ($p<0.001$ and $p<0.001$ for teachers; $p=0.029$ and $p=0.018$ for students; $p<0.001$ and $p=0.005$ for parents). It is also noteworthy that between March and May 2020 the percentages of students and parents with unlimited and unlimited connection were practically the same. Only teachers were relatively well positioned with this access. In this way, and in a very general way, these results suggest a change in home Internet plans during the pandemic, something that we could see coming with the entry of the generalized adoption of technology for the development of distance classes.

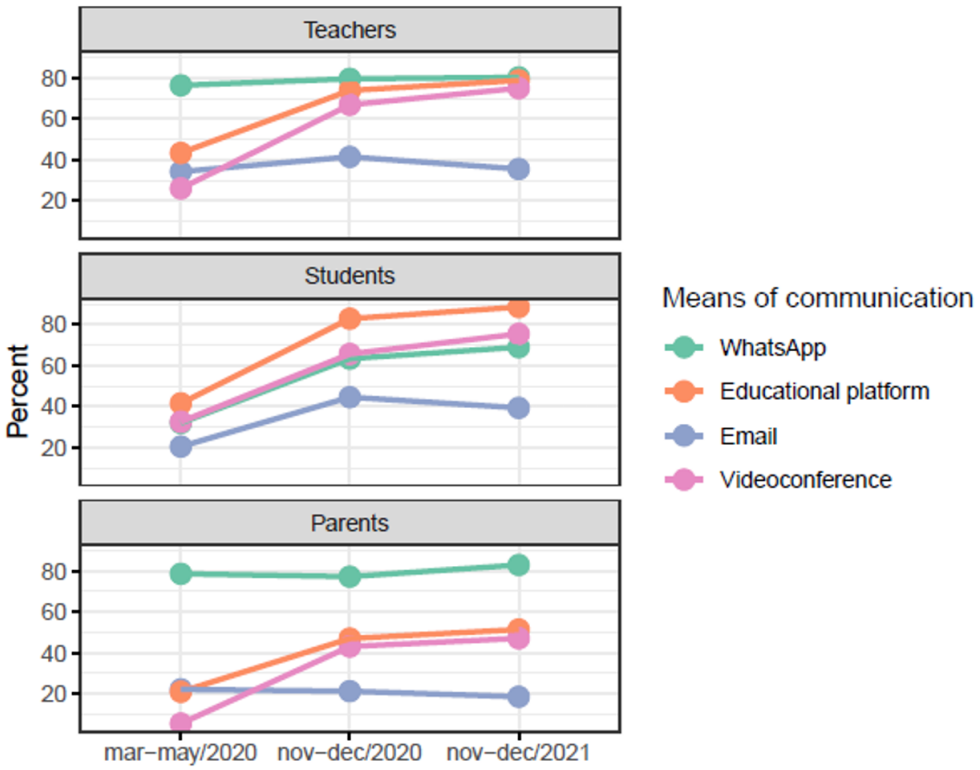
Table 3. Distribution of educational stakeholders according to type of Internet connection at home.

	Unlimited	Limited	Total
Teachers	**64,0%**	**36,0%**	**100%**
Mar-May/2020	59,6%	40,4%	100%
Nov-Dec/2020	72,6%	27,4%	100%
Nov-Dec/2021	78,8%	21,2%	100%
Students	**52,4%**	**47,6%**	**100%**
Mar-May/2020	49,7%	50,4%	100%
Nov-Dec/2020	57,1%	42,9%	100%
Nov-Dec/2021	67,2%	32,8%	100%
Parents	**57,1%**	**42,9%**	**100%**
Mar-May/2020	51,2%	48,8%	100%
Nov-Dec/2020	67,3%	32,7%	100%
Nov-Dec/2021	70,0%	30,0%	100%
Total	**58,4%**	**41,6%**	**100%**

Own source.

Effective communication among the members of the educational community is extremely important, regardless of whether the classes are face-to-face or virtual, although greater attention is paid to the latter modality due to its own characteristics. During the pandemic, an enormous effort was made to find efficient tools to establish communication from a distance. The four main means used for this purpose during the two years of the pandemic are shown in Figure 1. It can be seen that the use of WhatsApp predominated throughout the educational process between 2020 and 2021. At the beginning only students used it infrequently, but later this use increased significantly ($p<0.001$), even at higher levels of education. The generalized use could be due to the fact that the vast majority of families have at least one smartphone with access to this application, which by the way does not consume large volumes of internet data compared to other applications. Videoconferencing and platforms also stand out as the means of communication used. The former increased significantly in use as the number of months increased. Table 4 shows the comparisons between the proportions of educational actors with respect to these means of communication. It only shows those differences between pairs that are significant ($p<0.05$) in a right-handed one-sided post hoc test.

Figure 1. Means of communication used by educational stakeholders during the pandemic.



Own source.

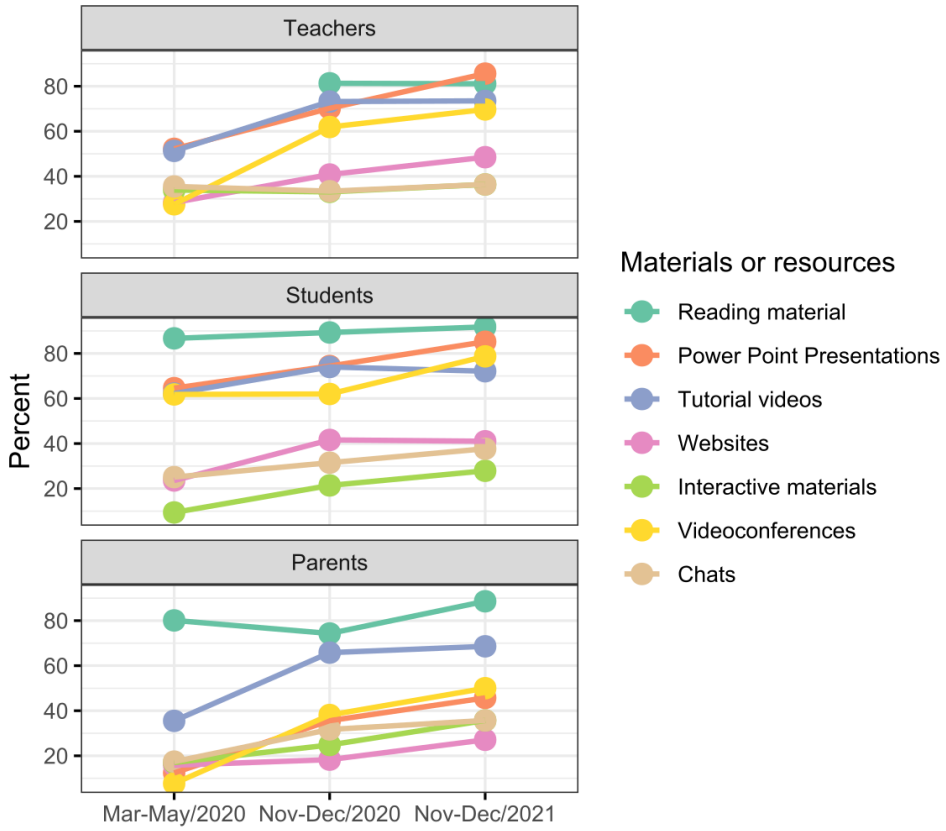
Table 4. Comparisons between proportions. Means of communication used.

		p global	Comparisons (only significant) (greater than)	*p* pairwise
Teachers	Email	0,076	Does not apply	——
	Videoconference	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001
			Mar-May/2020 vs Nov-Dec/2021	<0,001
	WhatsApp	0,368	Does not apply	——
	Platform	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001
			Mar-May/2020 vs Nov-Dec/2021	<0,001
Students	Email	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001
			Mar-May/2020 vs Nov-Dec/2021	<0,001
	Videoconference	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001
			Mar-May/2020 vs Nov-Dec/2021	<0,001
	WhatsApp	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001
			Mar-May/2020 vs Nov-Dec/2021	<0,001
	Platform	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001
			Mar-May/2020 vs Nov-Dec/2021	<0,001
Parents	Email	0,783	Does not apply	——
	Videoconference	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001
			Mar-May/2020 vs Nov-Dec/2021	<0,001
	WhatsApp	0,612	Does not apply	——
	Platform	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001
			Mar-May/2020 vs Nov-Dec/2021	<0,001

Own source.

A variety of educational materials and resources were used during the two years of the pandemic (Figure 2). Initially, low proportions of educational stakeholders made frequent use of these resources. In general, four were the most frequently used materials; video tutorials, video lectures, Powerpoint presentations and reading materials. In some instances, the uses were changing and adjusting to the need of the moment. Table 5 shows the main changes in use for the three educational actors. It shows significant increases in the proportions of people who used all the resources listed. These increases, in most cases, occurred from the beginning of 2020 to the end of 2020. Few resources were used in the same proportions in all three stages of the study (Teachers; interactive materials (p=0.804), chat rooms (p=0.768) and reading materials (p=0.999), Students; chat rooms (p=0.039; post hoc test detected no differences) and reading materials (p=0.354) and Parents; web pages (p=0.062)). Comparisons, in this case, were made by taking one phase versus the previous ones.

Figure 2. Teaching materials and resources used.



Own source.

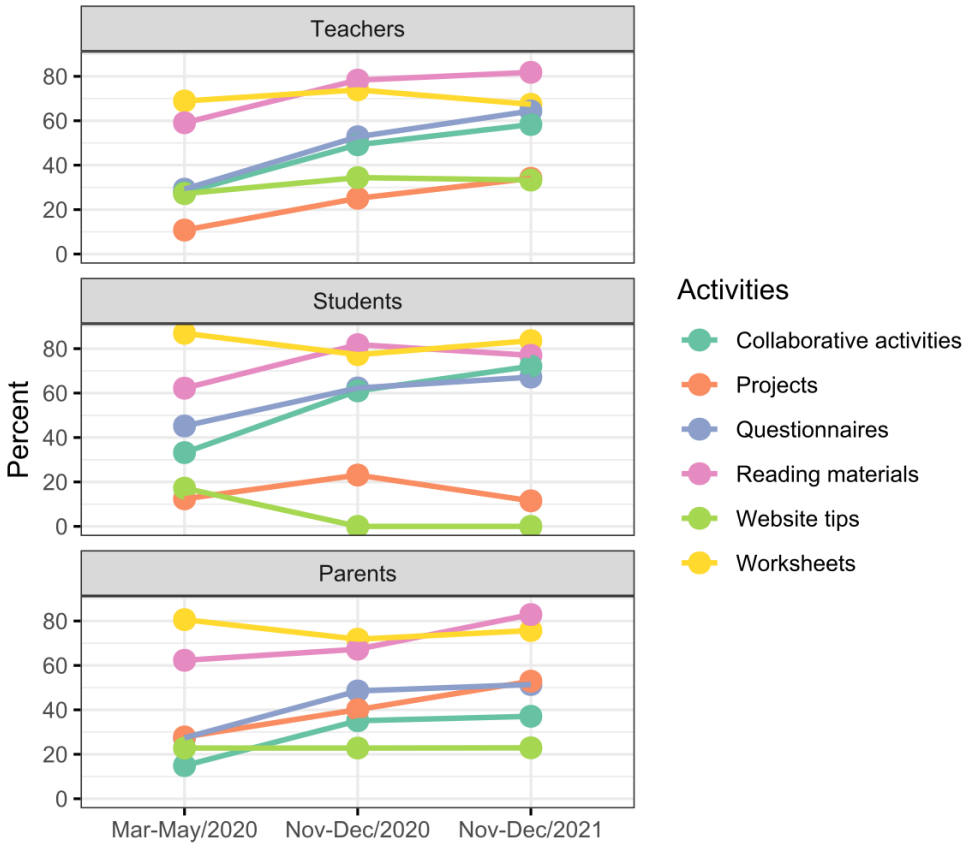
Table 5. Comparisons between proportions. Materials and resources used.

		p global	Comparisons (only significant)	*p* pairwise (greater than)
Teachers	Interactive materials	0,804	Does not apply	——
	Chats	0,768	Does not apply	——
	Websites	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001
			Mar-May/2020 vs Nov-Dec/2021	<0,001
	Video Tutorials	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001
			Mar-May/2020 vs Nov-Dec/2021	<0,001
	Videoconferences	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001
			Mar-May/2020 vs Nov-Dec/2021	<0,001
	Powerpoint Presentations	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001
			Mar-May/2020 vs Nov-Dec/2021	<0,001
			Nov-Dec/2020 vs Nov-Dec/2021	<0,001
	Reading materials	0,999	Does not apply	——
Students	Interactive materials	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001
			Mar-May/2020 vs Nov-Dec/2021	<0,001
	Chats	0,039	No difference was detected	——
	Websites	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001
			Mar-May/2020 vs Nov-Dec/2021	0,005
	Video Tutorials	<0,001	Mar-May/2020 vs Nov-Dec/2020	0,001
	Videoconferences	0,032	Mar-May/2020 vs Nov-Dec/2021	0,022
			Nov-Dec/2020 vs Nov-Dec/2021	0,022
	Powerpoint Presentations	<0,001	Mar-May/2020 vs Nov-Dec/2020	0,006
			Mar-May/2020 vs Nov-Dec/2021	0,006
			Nov-Dec/2020 vs Nov-Dec/2021	0,048
	Reading materials	0,354	Does not apply	——
Parental	Interactive materials	<0,001	Mar-May/2020 vs Nov-Dec/2020	0,025
			Mar-May/2020 vs Nov-Dec/2021	<0,001
	Chats	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001
			Mar-May/2020 vs Nov-Dec/2021	<0,001
	Websites	0,062	Does not apply	——
	Video Tutorials	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001
			Mar-May/2020 vs Nov-Dec/2021	<0,001
	Videoconferences	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001
			Mar-May/2020 vs Nov-Dec/2021	<0,001
	Powerpoint Presentations	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001
			Mar-May/2020 vs Nov-Dec/2021	<0,001
	Reading materials	0,03	Nov-Dec/2020 vs Nov-Dec/2021	0,03

Own source.

Figure 3 shows the responses of teachers, students and parents regarding the educational activities that were proposed during the remote emergency classes. The three actors agreed that the activities most considered were the reading of didactic materials and the worksheets. More than 60% of each of them responded to this fact. However, high proportions of teachers and students also expressed that they carry out collaborative activities and activities through online questionnaires. Projects and tips for visiting web pages were not widely highlighted by these two groups. However, parents reported project-related activities in a high proportion (doubled from Mar-May/2020 to Nov-Dec/2021). Most of the reported activities underwent significant changes as the development of classes through digital media during this pandemic progressed. Table 6 evidence these changes (direction and level of significant difference).

Figure 3. Main activities proposed.



Own source.

Table 6. Comparisons between proportions. Suggested activities.

		p global	Comparisons (only significant)	*p* pairwise
Teachers	Collaborative activities	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001*
			Mar-May/2020 vs Nov-Dec/2021	<0,001*
			Nov-Dec/2020 vs Nov-Dec/2021	0,049*
	Website tips	0,03	Mar-May/2020 vs Nov-Dec/2020	0,028*
	Questionnaires	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001*
			Mar-May/2020 vs Nov-Dec/2021	<0,001*
			Nov-Dec/2020 vs Nov-Dec/2021	0,017*
	Worksheets	0,209	Does not apply	——
	Reading materials	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001*
			Mar-May/2020 vs Nov-Dec/2021	<0,001*
	Projects	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001*
			Mar-May/2020 vs Nov-Dec/2021	<0,001*
			Nov-Dec/2020 vs Nov-Dec/2021	0,035*
Students	Collaborative activities	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001*
			Mar-May/2020 vs Nov-Dec/2021	<0,001*
	Website tips	——	Does not apply	——
	Questionnaires	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001*
			Mar-May/2020 vs Nov-Dec/2021	0,002*
	Worksheets	0,002	Mar-May/2020 vs Nov-Dec/2020	0,001**
	Reading materials	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001*
			Mar-May/2020 vs Nov-Dec/2021	0,034*
	Projects	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001*
Parents	Collaborative activities	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001*
			Mar-May/2020 vs Nov-Dec/2021	<0,001*
	Website tips	0,999	Does not apply	——
	Questionnaires	<0,001	Mar-May/2020 vs Nov-Dec/2020	<0,001*
			Mar-May/2020 vs Nov-Dec/2021	<0,001*
	Worksheets	0,034	Mar-May/2020 vs Nov-Dec/2020	0,021**
	Reading materials	0,003	Mar-May/2020 vs Nov-Dec/2021	0,002*
			Nov-Dec/2020 vs Nov-Dec/2021	0,02*
	Projects	<0,001	Mar-May/2020 vs Nov-Dec/2020	0,002*
			Mar-May/2020 vs Nov-Dec/2021	<0,001*
			Nov-Dec/2020 vs Nov-Dec/2021	0,043*

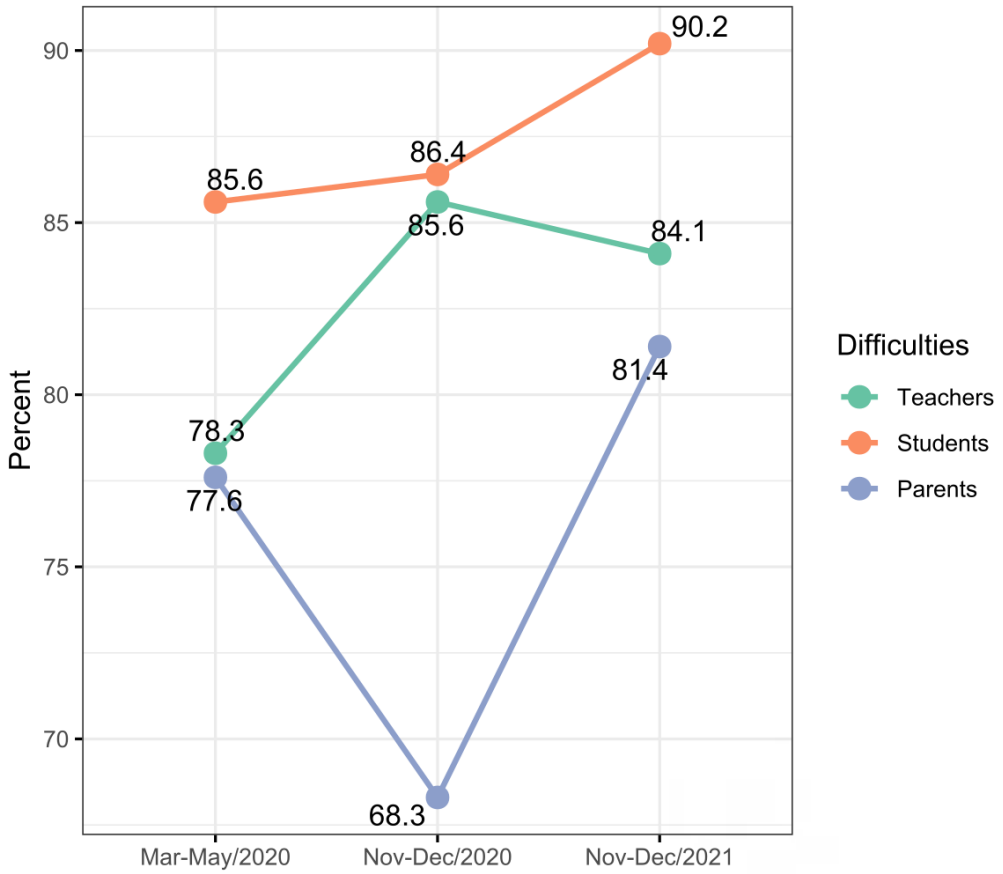
* indicates that the ratio is greater (from right to left)

** indicates that the ratio is lower (from right to left).

Own source.

Regarding difficulties, Figure 4 reveals high percentages of the three educational actors who responded having difficulties (more than 68% in the three phases of the study). The students' manifestation suggests that as pandemic education was carried out, the presence of difficulties increased slightly, although this increase did not prove to be significant (p=0.62). On the other hand, the proportion of teachers with difficulties was higher in the second phase of the study (p=0.009) than in the first phase, while among the other combinations of phases the proportions did not undergo significant changes. On the other hand, the proportion of parents reporting difficulties decreased significantly by the end of 2020 (p=0.023). On average, students had greater difficulties than parents and teachers.

Figure 4. Distribution of educational stakeholders by presence of difficulties.



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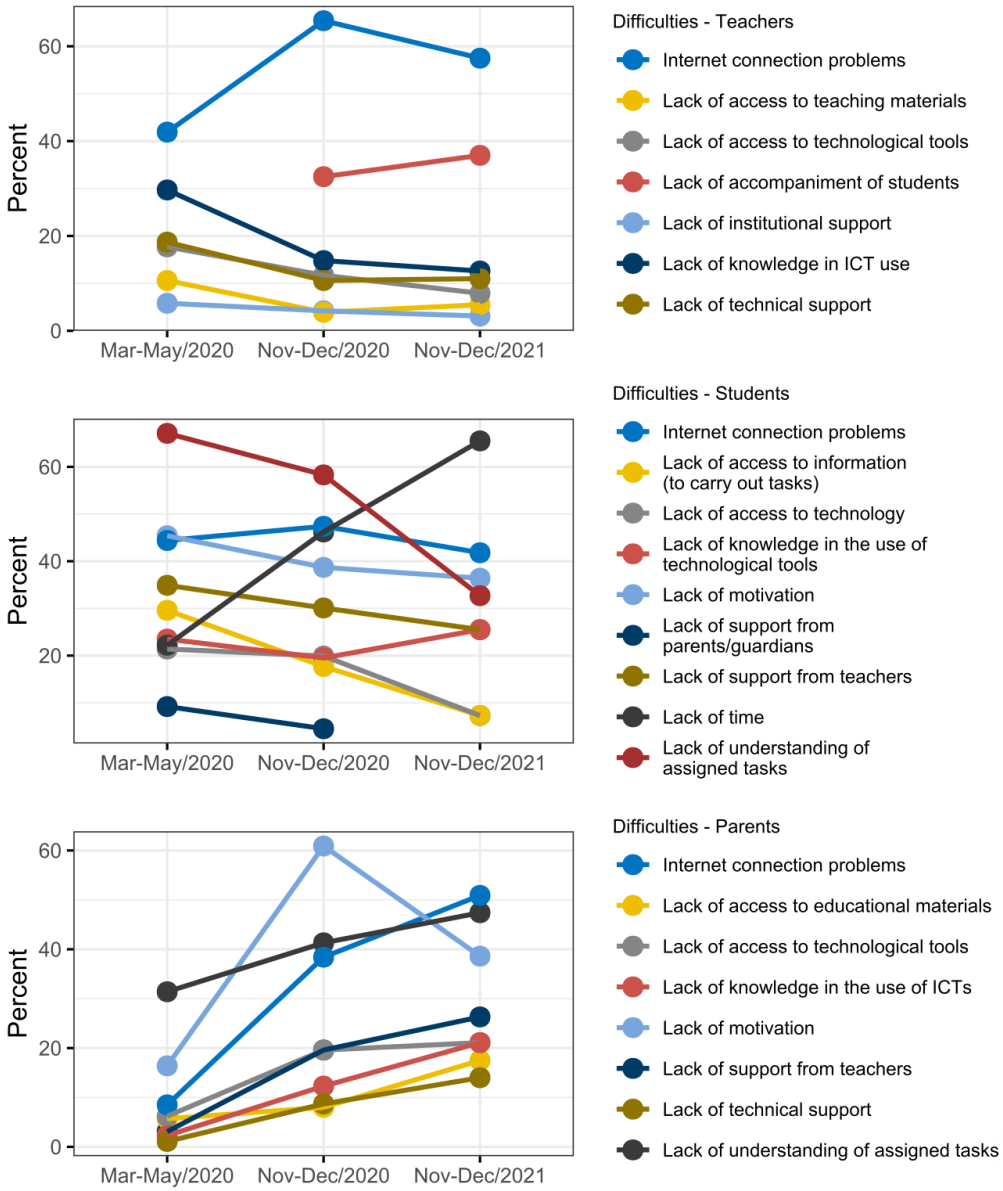
In all three phases of the study, problems related to Internet connection persisted for teachers. More than 40% of the teachers reported having these problems during the two years of remote education. The second major problem presented to the teachers, according to their self-perception, was the lack of student support. Many stated that the students did not adequately accompany the educational activities during the pandemic and that this may be due to different factors such as lack of self-esteem or lack of adaptation to the sudden change of modality. Other difficulties expressed by teachers, but in lower proportions, were the lack of knowledge in the use of ICT, lack of technical support, lack of access to technological tools and lack of access to teaching materials, which were decreasing by the end of 2021 (Figure 5).

On the other hand, a considerable decrease was observed in the lack of understanding of the activities by the student as the classes developed. From around 70% of students with this difficulty at the beginning of the remote classes, it dropped to approximately 30%. However, lack of time to complete all the educational activities was the difficulty that increased the most (from 20% to approximately 65%). Of those students with this difficulty, in the first two phases, high percentages (more than 65%) considered the number of tasks proposed to be excessive, although these percentages were significantly reduced in the third phase (25%). Also, on average, 45% of the students reported having Internet connection problems.

Meanwhile, the most notable difficulties expressed by parents are associated with internet connection problems (which experienced a continuous increase during the two years), lack of understanding of assigned tasks (also with an increase, but less than the difficulty mentioned above) and lack of motivation (which had a significant peak at the end of 2020). The other difficulties expressed by parents underwent increases, in some cases slight and in others moderate (Figure 5).

Figure 5. Distribution of difficulties according to educational actor.



Own source.

4. Analysis of open-ended responses

The three educational stakeholders shared some interesting insights into the challenges and opportunities that arose during the remote classrooms in the pandemic, and which may continue to present challenges in some post-pandemic context. The open-ended responses presented here come from the third phase of the study, which considered that two-year experience in education under the restrictions put in place to deal with the pandemic.

4.1 Challenges

The sudden arrival of the pandemic left a seemingly unanswerable uncertainty and exposed certain technological deficiencies that many teachers, students, and educational institutions had. One teacher expressed that the pandemic "Unveils the shortcomings of the system in the use of technologies and how little is known about these tools as a fundamental element for the cognitive and proactive development of the actors in the educational field and their transfer to the everyday world."

As far as Internet connection is concerned, this aspect represents an extremely important challenge for several actors and one that requires special attention in the not too distant future. The distribution of coverage and accessibility is still skewed towards certain areas of the country, and the high cost involved makes it difficult to deal with other household economic issues. This is closely related to the implementation of technologies within the educational field and how they can be used from the position in which each actor is located. Some manifestations associated with these issues were:

Improve internet connectivity for certain parts of the country and training of teachers in distance education. (...) (Student)

Improve connectivity and the implementation of information and communication technologies at all levels and reduce costs. (...) (Student)

(...) Not everyone has access to computers, let alone the internet with the necessary speed to carry out the class. (...) (Teacher)

(Challenge) Internet access, very expensive. Lack of cell phones and computers at home (...) (Teacher) (Challenge)

The biggest challenges were that our students could have access to technological tools (...) (Teacher)

One of the biggest challenges is access to technology and the Internet for students, as well as the development of skills that allow students to work autonomously from home. (Teacher)

Lack of technological adaptation for students. They do not have technological resources or sufficient access to the Internet, so information is lost (...) (Teacher).

In this same dimension, a teacher reported that "it is necessary to teach them (students) to use virtual platforms and not only WhatsApp. It is very difficult for teachers to give answers only through WhatsApp. They are bombarded with messages; they are robbed of privacy and time off. I believe that hybrid and even virtual education is possible, but children and young people must learn to use other virtual tools and have the necessary means to access them."

One of the things that was discussed a lot during these two years was how to maintain the students' motivation towards their studies with the implementation of a new modality for them and the adaptation that this implied. In this sense, some actors considered these aspects as not minor challenges.

The challenge was to maintain motivation (Student).

The challenge was to have resisted the pressure to continue as a student in the face of uncertainty about the continuity of studies (Student).

That the children had to adapt to the fact of not socializing with their peers and adults of reference, learning without living the experience, getting bored in many cases due to the different dynamics that must be used in the virtual environment. In many cases, like ours, they were left in charge of people who do not handle the use of technology well and in case of inconveniences they could not solve the problems that arose. (Father).

As a challenge, I believe that the motivation of the students as a means to learn the knowledge was a challenge (Parent).

I think it is necessary to prepare the student as a self-learner. In spite of all the constructivist discourse, the university student needs a significant follow-up and motivation from the teacher. When the teacher's presence is limited, the student's interest and motivation diminishes or ceases. (Teacher)

The biggest challenge for teachers during the pandemic is to motivate students to continue in class and maintain quality education during the school year. In particular for me the biggest challenge in these two years was to motivate my students, but above all to instill an educational ethic through the teaching-learning process and above all to instill a sense of honesty and responsibility in them. (Teacher)

Also, complying with all the proposed activities represented a challenge, mainly for the students. "The challenge was to comply with all the proposed tasks, read, summarize, understand the materials in a short time to be able to do the tasks and meet the deadlines," said a student. In contrast, a teacher expressed that a challenge was to maintain, in the student body, "Commitment, discipline, responsibility, making the most of the fact that we do not spend on airfare, snacks or dinner because it entails an expense to go (in a) face-to-face manner. (Student).

Regarding teacher training in the use of technological tools, several responses were shared. Among the most noteworthy were the following:

The lack of significant training in the use of platforms (Moodle) to be used by teachers and students; the inability of students to take responsibility for being the authors of their own knowledge. The school does not develop these skills in the students, therefore they are not prepared when entering the university environment (Teacher).

The challenge is to continue improving in terms of teacher training (...) (Parent)

From my point of view, I think the main challenge was to adapt to the virtual modality. However, it seems to me that this was also an opportunity to acquire knowledge in the computer area. Many young people and teachers were able to learn many things in this area, which I think is beneficial for all students and professionals. (Student)

4.2 Opportunities

Despite the many difficulties and challenges that were faced, several educational actors emphasized that it is time to take advantage of everything learned during the pandemic and incorporate improvements in the educational system with the support of existing technologies, which are increasingly essential for sustainable development. This is an excellent opportunity for educational technological appropriation. Some of the most important demonstrations were:

(...) the greatest opportunity is that we can do py education in two ways: face-to-face and virtual, also hybrid. The face-to-face and the virtual one, also hybrid (Parent).

As an opportunity, the access to virtuality, which I thought was excellent… it was a step that should have been taken even earlier. (Parent)

As a challenge we have the management of technological tools and as opportunities I believe that it opens a range of possibilities to improve the classes in terms of dynamics, design and even interaction with the students. (Teacher)

To obtain the maximum potential for students in the use of educational platforms, ICT and the Internet (Teacher).

The main opportunities were the familiarization with the daily use of technology in the classroom, the achievement of a certain level of self-taught learning in the children and improvement in the level of accompaniment of the family to the PD process of the students. (Teacher)

Others emphasized that the distance learning modality has certain advantages over face-to-face. These probable advantages were discovered during the implementation of virtual education in response to Covid-19. In this sense, one student expressed that "Through the distance modality you can manage to participate in classes without having to ask permission from the people where you work (...)". On the other hand, another student highlighted "The opportunity to have better attendance and that the teaching materials are available on the networks (which) also influences a better grade."

One parent said it is urgent to "Reinstate socialization, 2 years without sharing, that helps the child mature. Currently they are more excited about playing with the computer than (about) socializing." Another parent stated "opportunities in relation to sharing more as a family and overcoming every challenge." Family togetherness became substantial and necessary to deal with the difficulties that persistently presented themselves. One parent explained that "It was a challenge and also an opportunity, the fact that we were our children's teachers during this time. It allowed us to be close to them, it strengthened the family bond and we have taught them many things and learned from them as well." Likewise, one student expressed that there was the opportunity for a "longer time spent in the family unit which in part reinforced the support required to continue studies and on the other hand, the lower travel costs when using virtual environments. These opportunities are linked to whether the student receives his or her own income or is funded by household income."

5. Discussion

The study indicates that with the passage of time during 2020 and 2021, educational actors had access to more technological tools such as computers for their educational performance. Also, the acquisition of unlimited internet increased over time as educational activities require more technological capacity and connection according to the resources used. The availability of these resources determines the effective development of remote classes. Other studies have shown that such resources are not always available to educational actors. For example, in a study on the impact of COVID-19 according to teachers, they indicated that the minimum level of classes could not be maintained due to the lack of internet connection or technological resources (Shagiakhmetova et al., 2022). Similarly, qualitative results indicate that teachers noted that students do not have sufficient knowledge to adequately use technological tools for academic purposes. These results agree with Alipio (2020), who also explains that the lack of skills to use technological tools for academic purposes may be due to students' socioeconomic status.

Regarding the use of technological resources, the study indicates that the main means of communication among educational stakeholders was the instant messaging application WhatsApp. However, other tools such as emails, educational platforms and video conferences were also used. In previous studies, it is indicated that WhatsApp is used for class development especially by those educational actors with internet access (Portillo et al., 2020). Video tutorials, videoconferences and PowerPoints and reading materials were also used for class development. The results coincide with other studies where teachers used a variety of resources for class development, such as digitized reading materials and videos (Portillo et al., 2020). Similarly, others indicated that teachers and students agreed that learning management system (LMS) quizzes and emails are effective learning and communication tools, but differed on the effectiveness of video conferencing, phone calls, and text messaging (Dovrat, 2022).

On the other hand, in the absence of the internet, stakeholders resort to the use of printed educational materials. This is more common in rural areas where connectivity is inaccessible (Exposito and Marsollier, 2020; Tadesse and Muluye, 2020). The difference in resource use caused by the lack of connectivity evidences the technological gap between those students with access to technological tools and/or internet and those without access. While the technology gap already existed, the COVID-19 pandemic exacerbated these differences especially affecting the development of classes for the most vulnerable communities in different parts of the country and the world (Cabrera, 2020; Gomez-Arteta & Escobar-Mamani, 2021; Bonilla-Guachamin, 2020; Molina-Pérez & Pulido-Montes, 2021).

The study indicates that students mostly reported lack of time for the development of tasks remotely as a difficulty. Other studies also reported lack of time as a difficulty but for both teachers and students (Peñuelas et al., 2020). For example, Kruszewska and colleagues (2020), indicate that teachers perceive that the time spent on remote teaching is much greater than the time spent on traditional teaching. This is due to the preparation needed for such classes. Also, as for students, the time spent on remote teaching may be greater due to the time spent on understanding the tasks or handling the technological tools. In similar studies, adolescents indicated having technical difficulties and limited skills in the use of software for academic activities (Korzycka et al., 2021).

Lastly, the study results highlight that despite the many difficulties faced, educational actors were able to identify opportunities during the learning process. The shift to online learning meant a change to a new teaching modality, opportunities for the re-evaluation of the curriculum structure and content as well as the availability of a diverse set of materials to fit students' needs. Other studies have also reported that educational actors identified several opportunities during these two years. For example, Kruszewska and colleagues (2020), noted that teachers considered the home office as convenient since they do not need to commute to work. Teachers are also better equipped to address difficulties to ameliorate social inequalities (Kruszewska et al., 2020). Moreover et al. (2021), identified opportunities within curriculum and pedagogy. They note the need to revise the curriculum to prepare students for the future in terms of critical thinking and provide students with a diverse set of materials to fit their needs and promote independent learning among other skills. Lastly, they indicate that institutions should consider collaboration with students on how to approach instruction in a more meaningful manner.

6. Conclusion

The study highlights the main trends in stakeholders' response during the COVID-19 pandemic in Paraguay. In line with current literature about educational responses within the context of the pandemic, challenges and opportunities were noted. All stakeholders who participated in the study (parents, students, and teachers) experienced similar difficulties during the educational process, including especially difficulties with access to technology and connectivity. Even though educational actors were able to identify opportunities, the use of ICT tools for the development of remote classes should be subject to evaluation by public policy and educational scholars, especially in countries where internet connection is limited and access to technological resources entail financial investments. Moreover, teacher training should be at the forefront of the educational policies that involve the use of ICT in the classroom. This will allow its efficient implementation as well as the provision of appropriate support for students and parents.

It is important to note that the study only reflects ICT used in the context of the pandemic and results are not generalizable to other situations where remote learning environments may be more robust and not put in place as an emergency solution to a crisis. The COVID-19 pandemic both exacerbated inequalities among educational actors by affecting their job security and access to consistent income and evidenced the gap among the haves and the have nots. Thus, to improve ICT literacy, increase its reach, and its positive impact for all educational actors at all levels, public policies should go hand in hand with educational policies and should seek to level the playing field for students, parents and teachers providing educational support and resources where they are most needed. This study is a steppingstone towards evidence-based policy making for a more supportive, just, and inclusive education.

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