Didactics and technology. Teaching lessons from long-term emergency remote education

Didáctica y tecnología. Lecciones docentes desde la escuela remota de emergencia de larga duración

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ABSTRACT

The Covid-19 crisis forced schools around the world to close their doors, but not all for the same length of time. Countries such as Peru had to find technological alternatives to continue education for an excessively long period: two academic years. At the end of the pandemic, in April 2022, the students returned to face-to-face classes, but in addition to the studies reporting the negative impact of long school closures on learning, what new pedagogical relationship did teachers establish with technology in this context? To answer this question, this paper sought to understand Peruvian teachers' perceptions of the relationship between didactics and technology that emerged after two years of technological mediation forced by school closure measures. This long-term exposure to technology makes the data in this study unique. To find out more about this change, an ad hoc questionnaire was carried out. The open-ended questions of the questionnaire were answered by 154 Peruvian basic education teachers in the metropolitan area of Lima. The information collected was analysed using a qualitative methodology. Their responses were used in an emergent coding process and the resulting codes were grouped into categories. After two years of school closure and in addition to the demand for better training and access to technology, teachers believe that all technology-mediated educational practices used in the emergency school should be part of the face-to-face experience. The only exception would be those that invade the privacy of teachers, students and families.

Keywords: Education technology, Peru, Basic education, Post Covid-19, Education.

RESUMEN

La crisis por Covid-19 obligó a las escuelas del mundo a cerrar sus puertas, pero no todas por el mismo tiempo. Países como Perú tuvieron que buscar alternativas tecnológicas para poder continuar ofreciendo educación por un periodo excesivamente largo de dos cursos académicos. Finalizado la pandemia, las clases volvieron a ser presenciales en abril de 2022, pero además del impacto negativo en el aprendizaje señalado por los estudios en periodos largos de cierre escolar, ¿qué nueva relación didáctica establecieron los docentes con la tecnología en ese contexto? Para dar respuesta, este trabajo buscó comprender la percepción del docente peruano en torno a la relación entre didáctica y tecnología generada tras dos años de mediación tecnológica provocada por el cierre de la escuela. Esta larga exposición a la tecnología es el marco que añade singularidad a los datos de este estudio. Para conocer este cambio se realizó un cuestionario *ad hoc* con preguntas de respuesta abierta contestado por 154 docentes peruanos de Educación Básica de Lima Metropolitana. La información recopilada fue analizada a través de una metodología cualitativa gracias a un proceso codificación emergente de las respuestas agrupando los códigos obtenidos en categorías. Luego de dos años de cierre escolar, además de la demanda de formación didáctica y acceso tecnológico, los docentes creen conveniente que todas las prácticas didácticas con tecnología de la escuela de emergencia formen parte de la escuela presencial, a excepción de aquellas que invaden la privacidad de docentes, alumnos y familias.

Palabras clave: Tecnología de la educación, Perú, Educación básica, Post Covid-19, Enseñanza

INTRODUCTION

Education in uncertainty (Mèlich, 2019) has become visible as a result of two processes, one slow but inexorable, the other dizzying but powerful. The crisis we are slowly experiencing today is caused by climate change, which manifests itself as an integral global challenge that requires the design of new solutions. These solutions, as Latour (2023) points out, must involve hope and political will. The other crisis, the coronavirus pandemic, which marked a turning point in all areas of our lives and for which no field and no one was prepared, is still fresh in our minds. The determination to continue educating in spite of Covid-19 – educating in health uncertainty – was far from being a simple and mechanical task. It was an act of resistance that has marked the history of students, parents, teachers, managers and politicians, from which educational lessons can be drawn (Marshall et al., 2022; Lobos et al., 2023; Suárez-Guerrero et al., 2021). We can still find alternatives to address the climate crisis, but we need to take note of what we have learned from the health crisis. This paper follows the second line: what the lessons are that can be drawn from this unprecedented experience to inform the study and debate on a potential post-Covid school and education environment.

The dimensions of analysis of basic education during a health crisis are broad and can touch on sensitive issues such as access, equity, teacher training, digital literacy, socio-emotional needs, school-home relationships, etc. (Huck & Zhang, 2021; Suárez-Guerrero & Lloret-Catala, 2022). However, from a pedagogical point of view, the emergency remote learning school (Hodges et al., 2020) – i.e., the version of the school that used multiple media (TV, radio, internet, etc.) and was the singular response to the pandemic – posed a unique didactic and technical challenge for teachers, in addition to the vital challenge of teaching with the deadly threat of the virus. There is evidence that, in addition to widespread digital literacy gaps among teachers (Martínez-Garcés & Garcés-Fuenmayor, 2020), many teachers were unfamiliar with distance or blended learning (Darling-Hammond & Hyler, 2020), from which they could draw models for teaching during the emergency. We could say that there was no validated pedagogical formula for teaching during the pandemic, everything had to be organised by trial and error. But even if there had been one, teachers lacked the digital skills to maintain it.

When technology became the only school interface, teachers – and students – did not react automatically. Learning slowed down and everyone went through a process of change in the way they thought about and implemented education. This time, however, the process was mediated by technology, which had to be reconstructed simultaneously. Part of this new teaching knowledge had to do with establishing a new theoretical and practical relationship between teaching and technology in a context of physical distance. In the context of the pandemic, teachers all over the world had to test, to a greater or lesser extent, their educational knowledge, attitudes and skills and prove that they could be effective in a technology-enabled emergency environment. Before the pandemic, technology was just one variable in education. With the pandemic, it became the educational environment. Thus, the technological dimension of post-Covid schools became a core area of work, not purely technical, but connected to various critical and current aspects where pedagogical knowledge is key (Jandrić & Hayes, 2022). This work inevitably opens up the debate on the hybridisation of teaching and learning (Cohen et al., 2020).

Among the critical pedagogical aspects worth mentioning is the new relationship that teachers have established with didactics and technology, which is particularly important in a long-term distance learning situation (World Bank, 2022). In order to understand how this new relationship between teaching and technology was established, this paper studies the perspective of teachers in a country that unfortunately had to resort to emergency remote schooling for almost two long and unfortunate academic years (Liberato & Alvarado, 2023). This type of work is related to the study of teachers' beliefs about technology (Tondeur et al., 2017), and this is where the particular research question of this study comes in: What new relationship have teachers established between education and technology over such a long period of emergency distance learning?

LONG-TERM EMERGENCY REMOTE SCHOOLING

People the world over experienced the pandemic, but not everyone with the same intensity. Good health care was not enough to contain the epidemic and mitigate its various effects. Although able to help mitigate the impact, the quality of each country's overall response depended on several key factors, including human development, political management and the Covid-19 strategy (Medina-Hernandez et al., 2022). In many countries, however, Covid-19 highlighted deep, pre-existing inequalities. One indicator of this is the Covid-19 death rate, which according to Worldometer[1] was extremely high in countries such as Yemen (18.1%), Sudan (7.9%), Syria (5.5%), Somalia (5%) and Peru (4.9%). This critical health factor, combined with economic disparities, poor governance and precarious living conditions, was a breeding ground for the disruption of all social dynamics, including the school system.

Latin America was one of the hardest hit regions in the world, along with Africa and Asia, where the pandemic led to significant health, economic and educational setbacks (World Bank, 2022). According to Acevedo et al. (2022), the reduction in school hours and the high percentage of students who dropped out of emergency education due to lack of connectivity reduced opportunities and lowered learning outcomes in the region. Today, however, there are still major educational disparities in Latin American countries that hinder the transition to post-Covid schooling. The main reason is their education policies, which have longstanding shortcomings in terms of equity and effectiveness (Darling-Hammond et al., 2021). Among these countries is Peru, which is used in this paper as a case study for the region.

According to UNESCO[2] monitoring data on the impact of the pandemic on global education, schools in Peru were closed for 75 weeks (two full school years) due to the pandemic. In Peru, as in other countries in Latin America, the pandemic affected the educational experience of both students and teachers. It negatively impacted academic performance and emotional and mental health (Almonacid-Fierro et al., 2021; Lobos, et al., 2023). But the Peruvian school was already suffering from other crises. Gómez-Arteta and Escobar-Mamani (2021) highlight two key facts: the first is that long before the pandemic, the Peruvian education system already had a marked inequality of access to quality educational services – and the emergency effectively exacerbated this inequality, reducing educational coverage and, even more so, its quality. Second, the long-term digital education response exacerbated the weaknesses of Peru's education system and widened social inequalities. For economic, geographical, and technological reasons, the Covid-19 school system prevented many students and their families from taking advantage of their right to education. Peruvian schools may have reopened their

doors in April 2022, but they are not the same schools. In terms of learning and social development, the country has suffered an incalculable loss that will be difficult to compensate for and will set the agenda for the years to come (Azevedo et al., 2021; Espinal, 2021). This work is framed within this educational crisis, exacerbated by the long period of closure of Peruvian schools.

The emergency response of the Peruvian Ministry of Education (Minedu) with a programme called "Aprendo en Casa" ("Learning at Home") (Andrade & Guerrero, 2021) was insufficient to mitigate the impact of the pandemic on Peruvian education. This educational service was intended as an alternative to maintain the school system during the two years of school closure and distancing. "Aprendo en casa" provided a series of educational programmes in different media (television and radio) and a platform with learning experiences, resources and guidance for students and teachers during the pandemic. However, not all Peruvian schoolchildren were able to access this alternative, as economic or geographical inequalities – the material conditions of virtuality – were an obstacle to access; as Narcizo (2021) points out, the digitisation of Peruvian schools is a poorly distributed good.

In general, Peruvian schools went through two years with a new health problem in addition to the existing challenges: social and economic inequality. Those most affected by the pandemic in general, and by remote emergency education in particular, were people living in poverty, women and indigenous Peruvians (Iguíñiz & Clausen, 2021). The technological alternative was inadequate and could not compensate for the old problems of Peruvian education that persisted during the pandemic. Why was this the case? According to Cáceres-Muñoz et al. (2020) and Van Lancker and Parolin (2020), because the opportunities offered by digitisation reproduce structural inequalities in students' homes. Thus, there is no cause and effect relationship between the use of technology and learning if we do not take into account the social conditions in which they are embedded.

However, in addition to the negative impact of the pandemic on learning, we also need to know its impact on teaching. Therefore, this paper seeks to answer the following: What new pedagogical image do teachers have of technology-based education after two years during which technology was the only interface between them and their students? As shown in this study, what the Peruvian teachers observed regarding the relationship between education and technology may be representative of most countries where the remote emergency school system lasted for more than 44 weeks (with some adjustments depending on the context).

Therefore, it is particularly important to understand how teachers redefined technology-based teaching during these two years of school closure, as they were exposed to the situation for a very long time. Apart from giving a voice to teachers by registering their ideas about education and technology (Tondeur et al., 2017), this type of study tries to focus not only on what technology can do, but also under what conditions it is possible to integrate it in education (Hidalgo Cajo & Gisbert-Cervera, 2022). This type of study can provide clues about the educational experience of the teacher during the school closure. With this in mind, we can advance the long-awaited recomposition of Peruvian education (Saavedra, 2023). Specifically, this study aims to identify which elements of an emergency education system can be maintained and strengthened, and which should be abandoned in post-Covid-19 schools. The aim was to understand Peruvian teachers' perceptions of the relationship between education and technology after two years of emergency digital education forced by Covid-19. The long-term exposure to technology makes the data in this study unique.

METHOD

Design

This study develops a qualitative research based on information collected from Peruvian teachers in the jurisdiction of the Local Education Management Unit (UGEL) of Lima 02[3] between May and July 2022, after the end of the health emergency period and the reopening of schools.

Population and sampling

The population consists of teachers who taught during the two academic years of emergency remote education in UGEL 02, a decentralised educational management body of the Regional Directorate of Education of Metropolitan Lima. UGEL 02 covers the districts of Rímac, San Martin de Porres, Independencia, and Los Olivos, and within regular basic education there are 1,394 early childhood education teachers, 2,959 primary education teachers, and 3,264 secondary education teachers (Ministerio de Educación de Perú, 2023). The questionnaire designed for this research was distributed through LimeSurvey. It was sent by UGEL 02 management to teachers who had taught in the remote emergency education period. A total of 281 teachers replied. After a filtering process, mainly based on the elimination of questionnaires with incomplete data, 154 respondents (120 women and 34 men) aged between 26 and 64 years ($\bar{x}$ = 49.22; Me = 50; SD = 8.76) were considered valid. Our study is descriptive because we are interested in the processes, meanings and understandings that emerge from teachers' words and/or descriptions. As this is a qualitative study, it is not our aim to obtain a representative sample and generalise the results. Of the respondents, 25% are early childhood teachers, 38% teach in primary schools and 37% in secondary schools. All of them teach in public schools (145 in state-run schools and 9 in privately-run public schools). Regarding teachers' home internet connection, all but one have this service and use it mainly through their mobile phone and computer (laptop or desktop). The use of tablets is very limited (4 teachers).

Instruments

An ad hoc questionnaire[4] was used to collect the information, consisting of two sections: I. General data (age, gender, level, type of school, years of service, region, type of internet connection and device) and II. Four open-ended questions about (1) educational digitisation strategies that worked during the health emergency and should be implemented in the face-to-face school, (2) technological emergency education strategies that should be discontinued in the face-to-face school, (3) pedagogical innovations needed to improve technology-based education in a post-Covid face-to-face school, and (4) main technological tools used during the pandemic.

Analysis procedure

We carried out a qualitative analysis of the responses to the second section of the questionnaire using Maxqda 2020 software in a process of inductive thematic analysis (Braun & Clarke, 2006). This allowed categories to emerge based on the four main themes raised in the questionnaire, as well as an additional category: teacher demands.

The latter included a large number of coded segments related to the demand for universal access to the internet and the request for more technological resources for both students and teachers. Figure 1 shows the result of the analysis (Lloret-Catala et al., 2023):

Figure 1
Coding system after qualitative analysis

Source: Created from Lloret-Catala et al. (2023).

RESULTS

Based on the coding system shown in Figure 1, the analysis of the 5 categories obtained according to the 3 educational levels in which the respondents teach (early childhood, primary or secondary) is presented in detail below. The results are presented through a combination of academic exposition and verbatim quotes from the participants.

Teaching digitisation strategies that worked in the emergency school and should be implemented in regular classrooms

Table 1 shows the frequencies of the codes used in the analysis of this category. The coded segments collected are analysed below for each level of education.

Table 1

Number of coded segments on technology-based teaching strategies that worked in the emergency school and should be maintained

	EARLY CHILDHOOD	PRIMARY	SECONDARY
Communication with technology	15	4	8
Educational resource	12	20	17
Technological resource	14	35	24
Apps	11	16	27
TOTAL	**52**	**75**	**76**

Source: Created from Lloret-Catala et al. (2023).

In early childhood education, teachers report that the teaching strategies that worked best are those related to communication using technology to keep in touch with students, parents and other teachers. The aim of these strategies is to communicate, send information, give feedback and meet virtually. The most commonly used applications to maintain this communication were WhatsApp, Google Meet and Zoom.

> *"The virtual meetings with parents have worked for us. They bring us closer so that we can keep them informed and they can support us in the strategies and projects that the children are doing at school (EC, 29, 1)".*

At this educational stage, the most commonly used educational resources were those based on gamification, such as interactive stories, interactive educational games, songs, educational videos, and readings. Technological resources included the use of slides, videos, infographics, recordings, educational software games, and songs. In terms of the applications most used by children in early childhood, "Aprendo en Casa" and the applications defined in the previous paragraph stood out.

At the next level, primary education, teachers also report that virtual communication was one of the most used resources. However, we observe that there are fewer coded segments and they are less relevant than in early childhood education. WhatsApp was the most widely used application for this purpose.

In relation to educational resources, educators report using the following in order of frequency: collaborative virtual group work, flipped classroom, and gamification via apps such as Kahoot, interactive worksheets, chain reading (producing texts collaboratively), and research activities. Finally, concerning primary education, the technological resources commonly used at this stage included videos, virtual classrooms, websites, blogs, and virtual libraries for information searches, online questionnaires, educational games, and interactive worksheets. The most frequently used applications were Kahoot, Google Forms, Classroom, Padlet, Meet, Zoom, WhatsApp, and Facebook.

In secondary education, as in previous stages, the use of digital media to communicate with students and their families was found to be effective in the emergency education period. Regarding educational resources, teachers utilised a range of techniques such as the flipped classroom, videos/songs/short films to stimulate reflection, collaborative brainstorming, feedback, project and challenge-based learning, cooperative work, virtual forums and debates, autonomous learning, readings, ongoing assessments, and cooperative learning groups. In terms of technological resources, and in order of relevance, we find the use of the flipped classroom, LMS (Learn Management System) platforms, videos and video tutorials,

motivational audio to encourage participation, videoconferencing, and applications to create infographics and presentations. Finally, regarding the applications, the most used (starting with the most common) were LMS (Edmodo, Classroom, Aprendo en Casa), WhatsApp, Zoom, Meet, Padlet, Jamboard, Khan Academy and Quizz.

> *"The use of videos/songs/short films to enhance the students' reflection and analysis at the beginning of the learning session (SE, 107, 1)."*

Technology-based teaching strategies in emergency education that should be discontinued in regular classrooms

In relation to this question, most teachers stated that all e-learning strategies should remain in face-to-face education, as most of them are very useful as complementary strategies. As shown in Table 2, it is worth noting that the higher the educational stage, the more coded segments were in favour of not eliminating any virtual education strategies.

Table 2
Number of coded segments of technology-based emergency schooling strategies that should be discontinued

	EARLY CHILDHOOD	PRIMARY	SECONDARY
None	11	15	23
Virtual classes	8	4	4
Use of social media	0	5	7
Evaluations without feedback	0	2	3
Virtual submission of work	0	7	0
Asynchronous communication	2	0	2
Group video calls	3	3	0
Virtual communication with families	2	0	0
Virtual group work	0	0	2
TOTAL	**31**	**36**	**41**

Source: Created from Lloret-Catala et al. (2023).

> *"I would not eliminate any of them, I think that the variety of strategies strengthens the teaching and learning process (EC, 79, Pos. 3)"*

> *"None. I believe that this virtual learning experience during the pandemic has taught us that digital technology is a great ally to strengthen students' learning in all circumstances, environments, spaces and contexts (SE, 38, Pos. 4)"*

However, looking at the data in Table 2, the use of mobile devices, especially WhatsApp and social networks for communication and feedback, emerges as the most expendable. Teachers at all three educational stages agree that mobile devices and instant messaging are the first things they would like to eliminate. The other strategies they mentioned they would eliminate in face-to-face education are virtual classes (especially in initial education), videoconferencing, assessment without feedback, and group work.

"Whatsapp lessons should not happen... Not anymore... nor should feedback be given via Whatsapp (PE, 265, 3)"

Educational innovations needed to improve technology-mediated education in post-Covid-19 schools

In this context, it is worth noting, as we can see in Table 3, that teachers at all three educational stages need technological and didactic training in order to be able to use technology correctly in the classroom.

Table 3
Number of coded segments on educational innovations needed to improve technology-mediated education in post-Covid schools

	EARLY CHILDHOOD	PRIMARY	SECONDARY
Virtual library	2	0	0
Active teaching methodologies	0	0	5
Gamification	6	4	0
Teacher training	14	22	14
Digital platforms	0	0	7
Communication and educational apps	0	5	0
TOTAL	**22**	**31**	**26**

Source: Created from Lloret-Catala et al. (2023).

"The most important thing would be to be trained in technological resources, but these must be according to our level. (EC, 127, Pos. 3)"

"There is a need for personal or institutional training in the use of educational strategies to be able to develop innovative actions. (EC, 279, Pos. 4)"

"The integration of technological resources as a constant and sustainable strategy for the achievement of learning (PE, 193, Pos. 4)"

"Ongoing training in the use of software to help teachers keep up with digital teaching. (SE, 133, Pos. 3)"

As far as specific innovations are concerned, we observe that they differ according to the educational stage. In early childhood education, there is a demand for a virtual library; in primary education, applications for communication, literacy and feedback; and in secondary education, integrated learning management platforms that allow for better communication, delivery and feedback. Secondary school teachers want virtual classrooms and platforms with multiple functionalities to manage the learning process.

"Establish integrated digital platforms where students have access to all information related to their studies and parents can also have access and be informed about their children's learning process and assessment. (SE, 38, 5)"

Number of coded segments on technological tools used during the pandemic

With regard to the last question, concerning the main technological tools used during the pandemic, segments were coded by device and purpose (Table 4). Firstly, we found that in all three educational stages, participants connected from both mobile devices and computers. In terms of applications, communication applications (Whatsapp, Meet, Zoom) continue to be the most used, followed by collaboration applications in the case of primary and secondary education (Padlet, Virtual Whiteboards, Google Drive, etc.), content creation applications in the case of primary and secondary education (Power Point, Genially, Canva, Mindomo, audio and video editing applications, etc.) and gamification applications such as Kahoot in the case of primary education. Finally, YouTube stands out among content repositories. In secondary education, in particular, we see extensive use of the virtual classroom.

Table 4
Number of coded segments on technological tools used during the pandemic

	EARLY CHILDHOOD	PRIMARY	SECONDARY
Virtual classroom	2	13	31
E-mail	2	1	3
Evaluation questionnaires	0	11	3
Creating content	11	14	15
Consuming content	8	12	7
Collaborative apps	6	27	20
Gamification apps	4	18	6
Communication apps	25	35	36
Mobile device/Smartphone	10	7	8
Computer (laptop or desktop)	10	7	7
Internet	4	7	4
TOTAL	**82**	**152**	**140**

Source: Created from Lloret-Catala et al. (2023).

Teachers' demands

Finally, although this is not a specific educational issue, we found a large number of statements related to the teachers' demands for universal access to the internet and for more technological resources at school and at home (Table 5).

Table 5
Number of coded segments on teaching demands

	Early childhood, primary and secondary school
Universal access to the internet	29
More technological resources	50
TOTAL	**79**

Source: Created from Lloret-Catala et al. (2023).

"There is a need for more multimedia spaces, more modern and less slow machines or equipment, for students to enjoy doing their work, stable internet connections, digital libraries with a variety of subjects and access to all areas of development. (SE, 117, 3)"

"First of all, students must be provided with the technological tools; without that, we can't move forward. (PE. 140, 6)"

"Every family should have an internet connection so that they can work on the virtual platforms. (219, Pos. 3)"

DISCUSSION AND CONCLUSIONS

There is no doubt that the Covid-19 pandemic has generated its own line of educational research on an international level (Colás-Bravo, 2021). There is a wide range of studies that address the impact of the pandemic on basic education worldwide, around different thematic axes such as: educational policies, access to technology, emotional health, socio-educational inequalities, etc. Despite the diversity, according to the review by Hammersteine et al. (2021), there is a consensus in pandemic education research: school closures had a negative impact on learning across the board, but this was more pronounced for younger students and students from lower socio-economic backgrounds. The information we contribute to this powerful and necessary line of research is not about how the closure affected students, but rather how it impacted on teaching practice. The idea is to study this new representation of a teacher's previous knowledge (didactics) in a new environment (technology) and in abnormal conditions such as those created by the pandemic. This line of research, which studies the value of educational perception (Tondeur et al., 2017), is of great interest to better understand the impact of pedagogical representations of technology in education (Blau, 2018; Suárez-Guerrero et al., 2023). The present work is in line with this approach.

In this sense, we can highlight four areas that make our object of study stand out: To begin with, such a long closure due to the pandemic forced Peruvians to rethink their basic education system – which was already in crisis – for two years (Cáceres-Muñoz, 2020). Second, far from being neutral and harmless, the use of digital technology directs attention and is an active part of decisions about self-awareness, mutual interactions, and conceptions of and interactions with reality (Floridi, 2015). Third, the experiences of teachers around the world are a source of knowledge about what happened during the pandemic. Together with their testimonies (Almonacid-Fierro et al., 2022), they constitute a scenario for the development of educational theory and practice. Finally, the pedagogical image constructed by teachers about the purpose of technology (Tondeur et al., 2017) is key to making its use meaningful in an educational context. Therefore, this paper is based on the assumption that in a unique educational context of long exposure to technology, technology adds a specific action system and teachers, in turn, use technology based on their conception of its purpose and functionality. Based on this assumption, what is the new relationship between education and technology that has developed among this group of teachers?

The pandemic not only accelerated the trial-and-error process of digitisation in all countries – a process for which none was fully prepared (Onyema et al., 2020) – but

also exacerbated the deterioration of the weakest education systems, creating new educational problems and aggravating existing ones (Pokhrel & Chhetri, 2021). In Peru, as in other countries where the duration of school closure was long (more than 44 weeks), we can observe a before and after in terms of academic performance (Espinal, 2021; Gómez-Arteta & Escobar-Mamani, 2021; Liberato & Alvarado, 2023). The pandemic therefore forces us to speak of the post-Covid-19 school not only as a return to normality, but as the beginning of a *new abnormal*.

Thus, among the wide range of variables that explain the presence of technology in pandemic education (Williamson et al., 2020), our focus here has been on the representation of didactics with technology. Regarding the representations that teachers believe should be maintained in face-to-face basic education after Covid-19, two main conclusions can be drawn from this study.

The first relates to technology-based teaching strategies in the context of long-term school closures. Teachers in our sample at all educational stages (early childhood, primary and secondary) indicated that they would continue to use all technology-based teaching strategies implemented during the pandemic. The exceptions are those, such as instant messaging, that may cross the line of privacy in the relationship between teachers, students and families. All teachers at all three stages have used communication applications on mobile devices, especially WhatsApp and social networks, and found them useful. However, they believe that they should be the first to be phased out in post-Covid education, along with videoconferencing – especially in early childhood education – assessment without feedback, and group work, which the respondents mentioned to a much lesser extent. However, there are also differences according to the educational stage. Early childhood teachers highlight some technology-based teaching strategies that focus on communication and gamification. Primary and secondary teachers, on the other hand, mention a much wider range of teaching strategies, including those related to fostering higher levels of student autonomy – such as virtual collaborative work, flipped classroom strategies, or task- or challenge-based learning.

The second conclusion concerns teachers' demands for the educational use of technology. On the one hand, the teachers in the sample stress the need to promote access to the internet and technological devices in both the family and school contexts. This point should not be underestimated, as many students still have no access to digital resources. On the other hand, this group of teachers makes a recurring demand. They make it clear that, after two years of emergency remote schooling, there is still a need for more training in virtual pedagogy, technology, and teaching strategies. This demand is a priority in the current teaching scenario (Portillo & López de la Serna, 2021).

Overall, this paper shows that the various technology-enhanced teaching strategies implemented in long-term basic education still have a place in face-to-face education. This suggests that teachers are developing increasingly hybrid conceptions of teaching and learning processes for post-Covid-19 education (Cohen et al., 2020). Therefore, the pandemic seems to have reinforced, at least from the teachers' perspective, the idea that teaching strategies can and should be thought of in a unified way. We need to overcome the dichotomy between face-to-face and virtual education and move towards a single blended scenario. In addition to greater flexibility and an additional level of teaching innovation, such a scenario can be a fertile field for reflection on didactics in hybrid environments.

NOTES

1. https://web.archive.org/web/20230307225341/https://www.worldometers.info/coronavirus/
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