



# The impact of parental confidence in using technology on parental engagement in children's education at home during COVID-19 lockdowns: evidence from 19 countries

Kyoko Taniguchi<sup>1</sup> 

Received: 5 December 2022 / Accepted: 5 May 2023 / Published online: 19 May 2023  
© The Author(s), under exclusive licence to Springer Nature Switzerland AG 2023

## Abstract

The COVID-19 pandemic brought dramatic changes to society, and many temporary changes, such as lockdowns and school closures, have had lasting effects on education and learning. School closures temporarily moved education to the home, where parents had to take responsibility for their children's education, and technology became an essential tool for supporting learning. This study examines the impact of parental confidence in using technology on parental support for children's education at home during the first COVID-19 lockdowns. Researchers and educational officers from 19 countries conducted an online survey from May to July 2020 and collected data from 4600 parents with children 6–16 years old. Participants were selected via snowball sampling. Data were analyzed quantitatively using simple tabulation, correlation analysis, and multiple linear regression. The results showed a relationship between parental support for children's education at home and parental confidence in using technology in all participating countries except for Pakistan. Furthermore, the data indicated that in almost all participating countries, parental confidence in using technology greatly impacted parental engagement in children's education at home, even after controlling for socioeconomic status.

**Keywords** Technology use · Parental engagement · Remote learning · School closures · COVID-19

## Introduction

The COVID-19 pandemic brought many changes to society, some temporary and others more permanent. Many temporary restrictions that were put in place early in the pandemic, such as business and school closures, have been lifted but have had

---

✉ Kyoko Taniguchi  
tanikyo@hiroshima-u.ac.jp

<sup>1</sup> Graduate School for Humanities and Social Sciences, Hiroshima University, 1-5-1, Kagamiyama, Higashi-Hiroshima, Hiroshima 739-8529, Japan

lasting effects. The school closures at the beginning of the pandemic are of particular concern in the field of education because of their effect on children's learning.

From March to August 2020, the average duration of school closures across 210 countries (UNESCO 2021b) was 11 weeks. The period was more than 20 weeks in 22 countries, including El Salvador, Colombia, Costa Rica, Honduras, and Sri Lanka. These school closures caused a loss in children's learning. For example, a study in the Netherlands reported that children 8–11 years old showed a learning loss of 0.08 standard deviations during the 8 weeks of school closures (Engzell et al. 2021). In Belgium, a study found that the 2020 cohort in primary school showed a learning loss of 0.17 standard deviations for mathematics and 0.19 for Dutch during the 9 weeks of school closures, compared with the 2019 cohort (Maldonado and De Witte 2021).

To minimize learning loss, some schools tried to conduct classes online during school closures, but regardless of the particular school situation, learning moved into the home. Children had no choice but to study at home during lockdowns and school closures, and this situation required parental support. Parental engagement has been shown to have a positive impact on children's education at home (Goodall and Vorhaus 2011), but the conditions of the pandemic challenged traditional modes of learning.

Parents faced numerous difficulties during school closures. First, many parents needed help providing their children with resources such as laptops and rooms for learning (Ali and Ishak 2020). They also needed to have the flexibility to adjust their work schedules to share electronic devices with their children (Häkkinen et al. 2020). In addition, parents with a lower level of education and single-parent families had less time to dedicate to their children's schooling (Bayrakdar and Guveli 2020).

The pandemic brought not only an increase in remote schooling but also the technology development to support it. The number of resources available for online education rapidly increased. Whether parents had the technological skills to support their children's use of these online educational tools during lockdowns became a vital factor affecting learning.

This study examines children's education at home during school closures at the beginning of the COVID-19 pandemic. The research focuses on parental engagement in children's schooling and parental confidence in using technology and considers the following factors: (1) the availability of electronic devices at home, (2) the status of internet access at home, (3) the level of parental engagement in children's education during school closures, (4) the relationship between parental confidence in using technology and parental engagement in children's education at home, and (5) the influence and effect of parental confidence in using technology on parental engagement in remote learning.

## Remote-learning challenges during COVID-19 school closures

During school closures at the beginning of the COVID-19 pandemic, the setting for children's learning moved from the school to the home. At home, children had to shift to learning individually instead of with peers, and the primary responsibility

for supporting their education shifted from teachers to parents. Thus, the educational environment became dependent on the home environment.

A growing number of studies have sought to clarify the remote-learning issues and challenges that arose during pandemic school closures. The primary factors that have been found to influence the educational environment in the home fall into three categories: (1) electronic device and internet access, (2) parents' social capital and available time to supervise their children's learning, and (3) parental confidence in using technology.

Reviewing the current studies concerning remote learning during the COVID-19 pandemic, Ali and Ishak (2020) reported that the primary challenges included parents' ability to provide their children with laptops and spaces conducive to learning. The evidence from research in Finland (Häkkinen et al. 2020) suggests that the availability of information and communication technology is key for remote schooling of children. However, whether children have sufficient access to electronic devices and an internet connection depends on their parents' capacity to provide them, which is often dependent on their economic status. The OECD (2020) reported that children from disadvantaged families often did not have access to an internet connection at home, which led to large learning gaps between children from affluent and low-income families. Research in Nigeria (Briggs 2020) revealed that parents with higher socioeconomic status tended to have more electronic devices and better internet access—and to prefer online classes more—than those with lower socioeconomic status. Although electronic devices and internet access were necessary components for ensuring sufficient-quality remote learning during the COVID-19 pandemic, it was not always possible for parents to provide these resources. However, recognizing the critical nature of this need—as highlighted in the context of remote learning during the pandemic—is, for many countries, a necessary step toward enhancing educational policies to meet learning needs.

Parents' social capital and available time to supervise their children's learning are also vital to the success of remote learning. The suddenness of school closures meant that parents were not likely to be ready to support learning for their children who were now at home all day. Based on interviews with parents, Fontenelle-Tereshchuk (2021) reported that remote learning was a burden for parents working full time and fulfilling household responsibilities. Some parents also needed to work at home while they supported their children's remote learning. Garen et al. (2021) found that most parents actively helped their children with their studies, but they reported that time management was the greatest challenge in parental engagement. Novianti and Garzia (2020) also reported that arranging a time for children to study at home was a challenge for parents. The social capital of parents influenced the amount of time available for children's studying as well. Bayrakdar and Guveli (2020) found that children from disadvantaged families or immigrant backgrounds in the United Kingdom had less study time at home. In addition, parents' own knowledge and education affects their support for remote learning, as they sometimes have difficulty helping their children, particularly at higher levels of education, even if they are willing and have the time available to do so. From an online survey, Nayir and Sari (2021) found that parents did indeed have difficulties teaching school curricula

during the pandemic. The challenges of parents' ability and availability to supervise their children's learning are essential issues in any discussion of parental engagement in education at home.

Parental confidence in using technology was also a significant factor in parental engagement with remote learning during pandemic school closures. Many schools have an online platform for sending messages or use online tools such as applications or social media to communicate with parents. In addition, the pandemic-driven school and business closures brought rapid development of new technologies and new uses for existing technologies, including ways for children to access online classes at home. For younger children in particular, parental engagement became necessary to facilitate online learning (Garen et al. 2021), and parents' technology skills influenced their children's capacity to access remote learning materials. Dimopoulos et al. (2021) mentioned that differences in parents' familiarity and comfort with information and communication technology caused inequalities in learning during the pandemic, as parents with better technology skills enhanced the quality of their children's schooling. Laxton et al. (2021) found that access to online resources is valuable in improving home learning environments. Parental confidence in using technology thus directly impacts children's access to learning activities that enhance the quality of education at home.

## Research methods

### Data

The International COVID-19 Impact on Parental Engagement Study (ICIPES) 2020 investigated parents' engagement in their children's education at home during the school closures of the COVID-19 pandemic (Osorio-Saez et al. 2021). The aim of ICIPES 2020 was to examine how parents and caregivers developed skills to engage with their children's remote learning. ICIPES 2020 looked at four domains: (1) school support for parents and children, (2) parental engagement, (3) home learning and family life balance, and (4) parental confidence in using technology. In addition, it collected parents' and children's demographic information.

The data were collected online from May to July 2020 during the first lockdowns of the COVID-19 pandemic around the world. The targeted population was parents and caregivers of children 6–16 years old (level 1 in the International Standard Classification of Education [UNESCO 2011]). The University of Bath collected data from 23 countries in five regions, and the representative for each country tried to collect at least 200 questionnaires. Snowball sampling was used, and the questionnaire was distributed to the targeted population through personal networks and social media. In total, 4658 questionnaires were collected from parents (see Table 1). The University of Bath then cleaned the data and created a codebook and shared it with representatives from each of the participating countries.

**Table 1** Questionnaire responses by country

Country	Number	Country	Number
Belgium	5	Japan	159
Cameroon	10	Mexico	244
Chile	1597	Pakistan	45
China	217	Peru	15
Colombia	94	Spain	28
Costa Rica	155	Sri Lanka	199
El Salvador	83	Tanzania & Zanzibar	58
Ethiopia	171	Turkey	78
Ghana	142	United Kingdom	191
Honduras	246	United States	289
India	54	Uruguay	61
Italy	517	Total	4658

## Analysis

Four countries—Belgium, Cameroon, Peru, and Spain—were excluded due to small sample sizes, leaving 4600 samples from 19 countries in the dataset. Before the analysis was performed, variables were constructed for parental activities supporting children and parental confidence in using technology (Osorio-Saez et al. 2020a, 2020b, 2021). Table 2 shows the components of these variables. Two different five-point Likert scales were used for all variables:

- 1–5 indicating never, rarely, occasionally, often, or always; or
- 1–5 indicating not at all, slightly, moderately, quite, or extremely confident.

Three types of analysis were conducted: simple tabulation, correlation analysis, and multiple linear regression. Table 3 shows the variables used in the analysis. First, the availability of electronic devices at home was examined, and a simple tabulation was performed for two variables: the number of electronic devices and the presence of a computer per child at home. Second, the status of internet access at home was investigated, and a simple tabulation was performed for two variables: the presence of an internet connection at home and satisfaction with the internet speed. Third, the level of parental engagement in children's education at home during COVID-19 school closures was examined, and a simple tabulation was performed for two variables: a parent teaching a child at home and a parent's time spent teaching a child at home. Fourth, a determination was made about the relationship between parental engagement in children's education at home and parental confidence in using technology, and a correlation analysis was conducted using two variables: parental activities supporting children and parental confidence in using technology. Finally, an estimation was made about whether parental confidence in using technology influenced parental engagement in children's remote learning, and a multiple linear regression was performed. The

**Table 2** Parental activities supporting children and parental confidence in using technology

Variable	Question
Parental activities supporting children	I follow my own ideas about what my children need to learn
	I mix my own ideas with the school's plan for what my children need to learn
	I list and prepare the activities myself before developing them with my children
	My children and I have a set homeschooling timetable
Parental confidence in using technology	I develop, with my children, spontaneous learning activities not necessarily school-related, such as cooking, woodwork, online games, physical activities
	I check the school's emails, blog, and website to follow the activities they suggest for the children
	I check the school's online platforms or portals to find out information about my child's homework and performance
	I help my child present more attractive digital content
Parent using technology for social networks	I follow on social media what other parents do and try to do exactly the same
	I follow on social media what other parents do and use it as inspiration
	I take ideas from relatives or friends using other means of communication (e.g., phone, WhatsApp, etc.)
	I share relevant information about my child with the school using email, apps, or social media

**Table 2** (continued)

Variable	Question
Parent using technology for building capacity	I look for ideas on the internet using different websites
	I play online games with my child
	I do troubleshooting on my child's computer
	I help my child with online homework
	I use parental controls on the computer, tablet, or TV
	I identify useful websites to support my child's learning
	I identify useful websites to support my role as a parent
	I learn new things online to support my child's curiosity
	I download apps and other digital materials to support my child's learning
	I check websites and apps to advance my knowledge to support my child's learning

**Table 3** Variables used in the analysis

Variable	Scale
Number of electronic devices at home	Total number of smartphones, tablets or iPads, laptops, and desktops
Computer per child at home	0 = No; 1 = Yes
Available internet connection at home	0 = No; 1 = Yes
Satisfaction with internet speed	0 = Not satisfied; 1 = Satisfied
Parent teaching child at home	0 = No; 1 = Yes
Parent time spent teaching child at home per week	1 = Less than 10 h; 2 = 11–20 h; 3 = 21–30 h; 4 = More than 31 h
Parental activities supporting children	Regressed scores of five variables regarding parental engagement
Parental confidence in using technology	Average of regressed scores of three variables: parent using technology as a tool or resource, parent using technology for social networks, and parent using technology for building capacity
Parent gender (Female dummy)	0 = Male; 1 = Female
Parent age	1 = Under 18; 2 = 18–24; 3 = 25–34; 4 = 35–44; 5 = 45–54; 6 = 55–64; 7 = 65–74; 8 = 75 years old or older
Socioeconomic status	Regressed scores of five variables: parent's years of schooling, parent's occupation, monthly household income, number of devices (smartphones, tablets or iPads, laptops, and desktops), and computer per child
Number of siblings	
Child's age	
Living with own child	0 = Others; 1 = Father and mother of child

descriptive statistics of the variables used in the multiple linear regression are shown in the appendix. The dependent variable was parental activities supporting children, and the independent variables were parental confidence in using technology; parent gender, age, and socioeconomic status; number of siblings; child age; and relatives staying with child. The formula is as follows.

$$y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} \dots + \beta_n x_{in} + \varepsilon_i$$

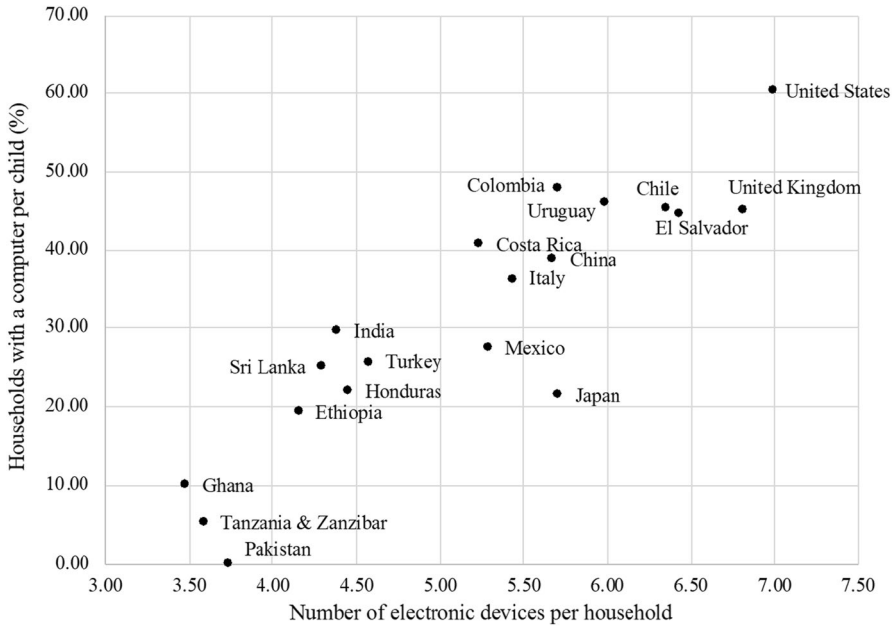
$i = 1, 2, \dots, n$ ,  $y_i$  = dependent variable,  $\beta_0$  = intercept,  $x_i$  = independent variable,  $\beta_i$  = coefficient,  $\varepsilon$  = error

## Results

### Availability of electronic devices

Figure 1 shows the number of electronic devices (e.g., smartphones, tablets or iPads, laptops, and desktops) at home and the percentage of households with a computer





**Fig. 1** Countries with more electronic devices per household also had more households with a computer per child

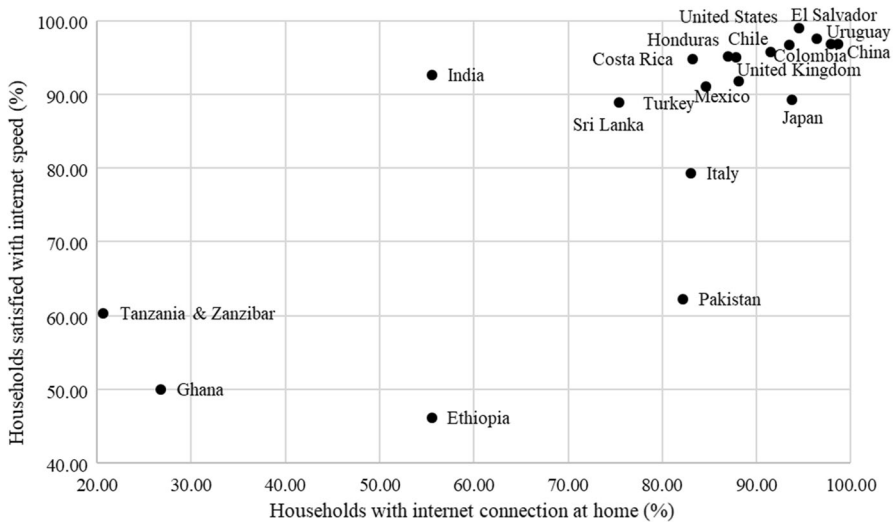
per child. In all countries, there were an average of three or more devices in each home. However, the number varied significantly between countries: in the United States, the United Kingdom, El Salvador, and Chile, for example, it was more than six, but in Pakistan, Tanzania and Zanzibar, and Ghana, it was fewer than four.

The percentage of households with a computer per child was quite different from country to country as well. In the United States, the percentage was around 60%; in Colombia, Uruguay, Chile, the United Kingdom, El Salvador, and Costa Rica, it was 40–50%; in China and Italy, it was 30–40%; in Mexico, Turkey, Sri Lanka, Honduras, Japan, and Ethiopia, it was 20–30%; and in Ghana, Tanzania and Zanzibar, and Pakistan, it was less than 10%.

The relationship between the number of electronic devices at home and the percentage of households with a computer per child indicates clearly that countries with more electronic devices in each home also tended to have more households with a computer per child. Electronic devices were widespread in the United States and the United Kingdom but not in Tanzania and Zanzibar, and Pakistan.

**Internet access and speed**

Figure 2 shows the percentage of households with internet access at home and the percentage satisfied with their internet speed. The percentage of households with internet access at home was over 90% in seven countries (China, the United



**Fig. 2** Countries in which more households had internet access at home also had more households that were satisfied with internet speed

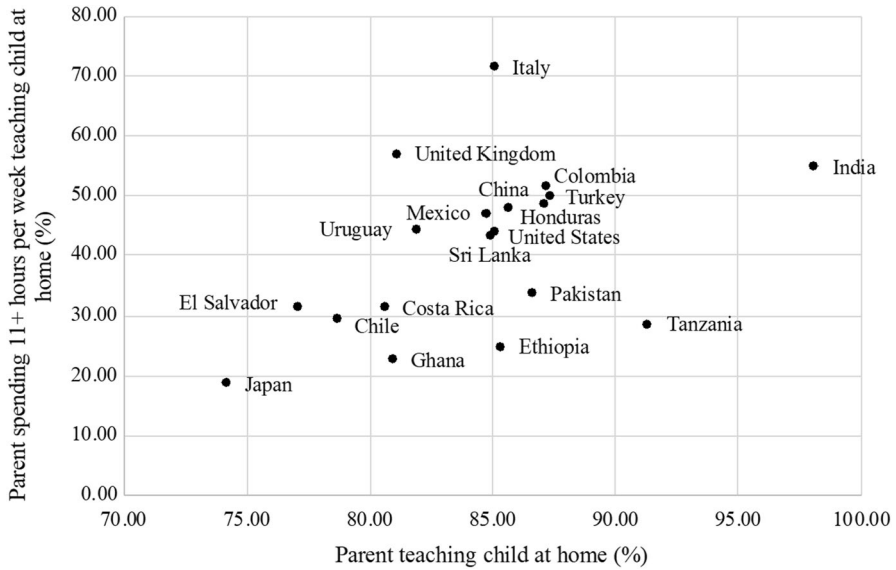
Kingdom, El Salvador, the United States, Japan, Uruguay, and Colombia) and 75–90% in eight countries (Mexico, Chile, Honduras, Turkey, Costa Rica, Italy, Pakistan, and Sri Lanka). In contrast, approximately half of households had internet access at home in India and Ethiopia, and in Ghana and Tanzania and Zanzibar, it was below 30%. In African and South Asian countries, such as Ghana, Tanzania and Zanzibar, Ethiopia, India, and Sri Lanka, the percentages accessing the internet from a mobile phone were higher: 57.04% in Ghana, 74.14% in Tanzania and Zanzibar, 25.73% in Ethiopia, 38.89% in India, and 21.60% in Sri Lanka.

The majority (80%) of households in all countries were satisfied with their internet speed; the exceptions were Pakistan, Tanzania and Zanzibar, Ghana, and Ethiopia, which also had lower percentages of households with internet access at home. The countries with higher percentages of households accessing the internet from mobile phones tended to have lower satisfaction with internet speed.

Countries with a higher percentage of households with internet access at home tended to also have higher satisfaction with internet speed, except for India and Pakistan. In Pakistan, a higher percentage of households had internet access at home but reported less satisfaction with speed; in India, the opposite was true: the percentage of households with internet access at home was lower, but satisfaction with speed was higher.

## Parental engagement

Figure 3 shows the percentage of parents teaching a child at home and the percentage of parents spending more than 11 h per week teaching a child at home. In all countries, more than 70% of parents responding to the survey said they taught their



**Fig. 3** In countries where more parents were teaching a child at home, parents also spent more time doing so

children at home. In India and Tanzania and Zanzibar, the percentages were high (over 90%); in Chile, El Salvador, and Japan, they were lower (below 80%).

The percentage of parents spending more than 11 h per week teaching a child at home varied more widely. In Italy, more than 70% of parents spent more than 11 h per week; in the United Kingdom, India, and Colombia, it was 50–60%; in Turkey, China, Mexico, Uruguay, the United States, and Sri Lanka, it was 40–50%; in Pakistan, El Salvador, and Costa Rica, it was 30–40%; and in Chile, Tanzania, Ethiopia, and Ghana, it was 20–30%. Surprisingly, in Japan, less than 20% of parents spent more than 11 h per week teaching a child at home.

Countries with a higher percentage of parents teaching a child at home tended to also have parents who spent more time per week doing so, the exceptions being Italy and the United Kingdom. India and Japan were outliers: in India, most parents taught a child at home and spent more time doing so, while in Japan, fewer parents taught a child at home and spent less time doing so.

**Relationship between parental engagement and parental confidence in using technology**

Table 4 shows the results of the correlation analysis for parental activities supporting children and parental confidence in using technology. Significant correlation relationships were present in all countries except for Pakistan. Ten countries, including Tanzania and Zanzibar, Ghana, India, and Italy, showed strong relationships. Parents who engaged in more activities supporting their children’s learning at home tended to have

more confidence in using technology, or parents with more confidence in using technology tended to engage in more activities supporting their children's learning.

### **Effects of parental confidence in using technology on parental engagement**

Table 5 shows the effects of parental confidence in using technology on parental engagement in children's remote learning. In Model 1, parental confidence in using technology was significant in all countries except for Pakistan. However, the effect sizes varied between 0.358, in Chile, and 0.886, in Tanzania and Zanzibar. In Model 2—which takes into account parent and child demographic information such as gender, age, socioeconomic status, siblings, and living arrangements—parental confidence in using technology was still significant in all countries except for Pakistan. These results suggest that parental confidence in using technology did influence parental engagement in children's remote learning during the pandemic school closures.

## **Discussion**

### **Were the availability of electronic devices and internet access satisfactory?**

Respondents in the majority of participating countries did not report adequate conditions in terms of the number of electronic devices per household and the number of households with a computer per child. The percentage of households with a computer per child was above 50% only in the United States. In other countries, it was significantly lower, especially in Pakistan, Tanzania and Zanzibar, Ghana, and, surprisingly, Japan. The results of the Program for International Student Assessment (PISA) in 2018 showed that the percentage of students using information and communication technology was lower in Japan than in other participating countries (NIER 2019), but the pandemic brought significant and rapid changes in Japan. During the pandemic, the government tried to provide a tablet to every child in primary and secondary schools, a practice that was critical for supporting remote learning in almost all countries.

The availability of internet access at home and satisfaction with internet speed were adequate in the majority of the countries. However, challenges emerged in South Asian and African countries such as Pakistan, India, Sri Lanka, Tanzania and Zanzibar, Ghana, and Ethiopia, where lower percentages of households had internet access at home and the percentages accessing the internet from a mobile phone were higher. In these conditions, it is almost impossible to study online, and children are more likely to suffer learning losses during school closures.

### **How engaged were parents in their children's education at home?**

Most parents supported their children's remote learning during school closures in all countries. However, the amount of time spent teaching children at home varied widely between countries. In India and Colombia, parents spent a great deal of time, but not in Japan. These results were consistent with data from UNESCO (2021a,

**Table 4** Relationship between parental engagement and parental confidence in using technology

		Tanzania and Zanzibar		Ghana		India		Italy	
		1	2	1	2	1	2	1	2
1	Parental activities supporting children	–		–		–		–	
2	Parental confidence in using technology	0.573*	–	0.494*	–	0.462*	–	0.462*	–
		El Salvador		Colombia		Costa Rica		USA	
		1	2	1	2	1	2	1	2
1	Parental activities supporting children	–		–		–		–	
2	Parental confidence in using technology	0.457*	–	0.452*	–	0.452*	–	0.446*	–
		Turkey		Uruguay		United Kingdom		China	
		1	2	1	2	1	2	1	2
1	Parental activities supporting children	–		–		–		–	
2	Parental confidence in using technology	0.415*	–	0.409*	–	0.389*	–	0.383*	–
		Honduras		Mexico		Ethiopia		Sri Lanka	
		1	2	1	2	1	2	1	2
1	Parental activities supporting children	–		–		–		–	
2	Parental confidence in using technology	0.373*	–	0.350*	–	0.344*	–	0.344*	–
		Japan		Chile		Pakistan			
		1	2	1	2	1	2	1	2
1	Parental activities supporting children	–		–		–		–	
2	Parental confidence in using technology	0.323*	–	0.278*	–	0.241	–	0.241	–

\* $p < 0.05$

**Table 5** Effects of parental confidence in using technology on parental engagement

Variable	Chile			China			Colombia					
	Model 1		Model 2	Model 1		Model 2	Model 1		Model 2			
	B	SE	B	SE	B	SE	B	SE	B	SE		
Parental activities supporting children	0.358***	0.031	0.351***	0.034	0.645***	0.106	0.594***	0.119	0.740***	0.152	0.755***	0.165
Parental confidence in using technology			0.096	0.065			0.001	0.143			0.177	0.223
Parent gender			-0.003	0.034			0.030	0.092			0.053	0.150
Parent age			0.001	0.025			-0.017	0.051			-0.018	0.058
Socioeconomic status			0.025	0.026			-0.118	0.069			-0.179	0.107
Number of siblings			-0.007	0.008			-0.010	0.022			0.030	0.028
Child's age			-0.067	0.058			0.032	0.200			0.176	0.202
Relatives living with child	-0.007	0.039	0.012	0.164	0.158	0.108	0.125	0.419	0.275*	0.138	-0.286	0.643
R-squared	0.077		0.079		0.147		0.160		0.204		0.261	
N	1597		1379		217		156		94		85	
Variable	Costa Rica			El Salvador			Ethiopia					
	Model 1		Model 2	Model 1		Model 2	Model 1		Model 2			
	B	SE	B	SE	B	SE	B	SE	B	SE		
Parental activities supporting children	0.661***	0.117	0.661***	0.128	0.784***	0.170	0.721***	0.178	0.615***	0.129	0.633***	0.132
Parental confidence in using technology			0.123	0.163			-0.089	0.205			0.195	0.134
Parent gender			-0.142	0.076			-0.201	0.104			-0.031	0.080
Parent age			0.026	0.033			0.004	0.057			0.040	0.055
Socioeconomic status			0.049	0.053			-0.081	0.109			-0.008	0.023
Number of siblings			0.007	0.021			-0.017	0.030			-0.017	0.017
Child's age			-0.095	0.127			0.147	0.188			-0.017	0.152

**Table 5** (continued)

Variable	Costa Rica			El Salvador			Ethiopia			
	Model 1	Model 2	SE	Model 1	Model 2	SE	Model 1	Model 2	SE	
Relatives living with child	-0.180*	0.263	0.414	-0.097	0.112	0.557	-0.164*	0.078	0.124	0.316
R-squared	0.173	0.204		0.209	0.285		0.119		0.138	
N	155	143		83	71		171		169	
Variable	Ghana			Honduras			India <sup>a</sup>			
	Model 1	Model 2	SE	Model 1	Model 2	SE	Model 1	Model 2	SE	
Parental activities supporting children	0.782***	0.116	0.538***	0.158	0.533***	0.085	0.541***	0.093	0.825***	0.220
Parental confidence in using technology			-0.102	0.147			0.067	0.126		
Parent gender (Female dummy)			0.130	0.089			-0.021	0.065		
Parent age			0.053	0.088			0.074	0.047		
Socioeconomic status			0.056	0.036			0.008	0.051		
Number of siblings			-0.045	0.025			0.024	0.018		
Child's age			0.137	0.157			-0.034	0.119		
Living with own child	0.175**	0.065	-0.185	0.448	0.048	0.062	-0.146	0.324	-0.115	0.128
R-squared	0.244	0.282		0.139	0.158		0.158		0.213	
N	142	77		246	223		223		54	

Table 5 (continued)

Variable	Italy			Japan			Mexico					
	Model 1		Model 2	Model 1		Model 2	Model 1		Model 2			
	B	SE	B	SE	B	SE	B	SE	B	SE		
Parental activities supporting children	0.736***	0.062	0.780***	0.067	0.570***	0.133	0.562***	0.145	0.559***	0.096	0.617***	0.124
Parental confidence in using technology			-0.061	0.159			0.028	0.161			-0.261	0.161
Parent gender (Female dummy)			0.069	0.064			0.263	0.149			-0.088	0.081
Parent age			0.005	0.029			-0.013	0.087			-0.001	0.041
Socioeconomic status			0.038	0.045			0.052	0.077			0.007	0.062
Number of siblings			-0.016	0.015			-0.011	0.027			0.005	0.020
Child's age			-0.147	0.117			-0.285	0.315			0.173	0.130
Living with own child	-0.040	0.045	-0.032	0.344	-0.684***	0.069	-1.548*	0.699	-0.332***	0.049	0.073	0.386
R-squared	0.213		0.249		0.104		0.121		0.122		0.162	
N	517		438		159		143		244		186	
Variable	Pakistan <sup>a</sup>			Sri Lanka			Tanzania & Zanzibar <sup>a</sup>					
	Model 1		Model 2	Model 1		Model 2	Model 1		Model 2			
	B	SE	B	SE	B	SE	B	SE	B	SE		
Parental activities supporting children	0.407	0.250	0.461	0.312	0.578***	0.112	0.582***	0.128	0.886***	0.170	0.773***	0.205
Parental confidence in using technology			-0.121	0.275			0.052	0.134			0.149	0.289
Parent gender (Female dummy)			0.063	0.176			0.128*	0.061			0.106	0.167
Parent age			-0.024	0.095			-0.020	0.050			-0.161	0.203
Socioeconomic status			-0.002	0.069			-0.069*	0.029			-0.008	0.063
Number of siblings			-0.009	0.046			0.028	0.020			0.042	0.051
Child's age			-0.242	0.270			-0.069	0.208			0.299	0.308



**Table 5** (continued)

Variable	Pakistan <sup>a</sup>			Sri Lanka			Tanzania & Zanzibar <sup>a</sup>					
	Model 1		Model 2	Model 1		Model 2	Model 1		Model 2			
	B	SE	B	SE	B	SE	B	SE	B	SE		
Living with own child	-0.150	0.097	-0.122	0.683	-0.075	0.059	-0.757	0.369	-0.079	0.116	-1.261	0.819
R-squared	0.058		0.103		0.118		0.194		0.328		0.309	
N	45		36		199		162		58		49	
Variable	Turkey <sup>a</sup>			United Kingdom			USA					
	Model 1		Model 2	Model 1		Model 2	Model 1		Model 2			
	B	SE	B	SE	B	SE	B	SE	B	SE		
Parental activities supporting children	0.647***	0.163	0.762*	0.282	0.691***	0.119	0.649***	0.138	0.735***	0.087	0.814***	0.093
Parental confidence in using technology			-0.261	0.306			0.025	0.265			-0.030	0.124
Parent gender (Female dummy)			0.359	0.201			0.093	0.116			-0.036	0.066
Parent age			-0.143	0.083			0.095	0.083			-0.058	0.059
Socioeconomic status			-0.041	0.127			-0.005	0.057			0.115*	0.056
Number of siblings			0.032	0.062			-0.039	0.029			0.022	0.020
Child's age			-0.270	0.477			0.221	0.184			-0.077	0.141
Living with own child	-0.107	0.083	-1.623	1.591	-0.420***	0.078	-0.634	0.505	-0.104*	0.050	-0.167	0.307
R-squared	0.172		0.358		0.152		0.165		0.199		0.256	
N	78		35		191		154		289		236	

Table 5 (continued)

Variable	Uruguay <sup>a</sup>		India <sup>b</sup>	
	Model 1	SE	Model 2	SE
Parental activities supporting children	0.535***	0.157	0.517**	0.163
Parental confidence in using technology			-0.134	0.326
Parent gender (Female dummy)			-0.086	0.303
Parent age			-0.261	0.145
Socioeconomic status			0.111	0.176
Number of siblings			-0.058	0.051
Child's age			0.026	0.326
Living with own child	0.024	0.119	0.968	1.321
R-squared	0.167		0.262	
N	60		57	

<sup>a</sup>The sample size was small

<sup>b</sup>In India, the model 2 was not computed because the sample size was too small

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

b). There was a strong relationship between the percentage of parents helping their children with education and the amount of time spent. In India, 95% of parents were teaching their children at home, and the average time spent was 12 h per week. In Colombia, it was 85% and approximately 8 h per week. In contrast, in countries where only 55% of parents were teaching their children at home, the average time spent was less than 3 h per week.

Parents were asked (via open-ended questions) the reasons why they did not spend time teaching their children at home (if they did not). As shown in Fig. 3, Japan, Ghana, and Ethiopia had lower percentages of parents spending more than 11 h per week teaching a child at home; the responses of parents in these three countries included a variety of reasons.

In Japan, most parents answered that the amount of homework was less during pandemic lockdowns, so children could do their homework by themselves, and the parents valued their children's independence. Some parents responded that they were busy with their own work and did not have time to teach their children. A few parents indicated that their children disliked being taught by their parents. Some answered that their children had online lessons that didn't require parental participation.

In Ghana, most parents answered that they lacked time, due to their own work. Some said they weren't prepared to teach, and a few responded that there were no teaching and learning materials at home.

In Ethiopia, some parents answered that they did not have time to teach and there were no materials at home. A few responded that their children could study by themselves.

In all countries, parents considered themselves lucky if their own work allowed them the time or ability to teach their children. In situations in which parents did not spend time supporting their children's education, the parents reported that they valued their children's independence or lacked teaching and learning materials at home.

### **Was parental confidence in using technology essential for parental engagement?**

This study found a relationship between parental engagement in children's education at home and parental confidence in using technology. It was clear that parents' confidence in using technology influenced their engagement in their children's remote learning during school closures. These results suggest that supporting or enhancing parental use of technology can play a key role in increasing parental engagement in children's education. These findings correspond with previous studies (Lewin and Luckin 2010). However, parental confidence in using technology varied between and within countries: the standard deviation was 0.393 in Pakistan and 0.762 in Uruguay (see Online Appendix). When checking each variable of parental confidence in using technology (see Table 2), the standard deviations of all variables were high, at more than 1.200.

Do parents who have higher socioeconomic status tend to have higher confidence in using technology? To answer this question, an additional analysis was conducted to examine the Pearson correlation coefficient between socioeconomic status and

parental confidence in using technology. Interestingly, its values were not high in all countries, meaning that parents who have higher socioeconomic status do not always have higher confidence in using technology. In addition, as shown in Table 5, the impact of parental confidence in using technology was significant in almost all countries, even after controlling for socioeconomic status.

## Conclusion

The COVID-19 pandemic brought changes in education. School closures increased parental engagement in their children's education, and technology use became a particularly significant factor in the quality of children's learning. Using data from surveys of parents in 19 countries regarding education at home during the first school closures of the COVID-19 pandemic, from May to July 2020, this study examined the following: (1) the availability of electronic devices at home, (2) the status of internet access at home, (3) the level of parental engagement in remote learning during school closures, (4) the relationship between parental confidence in using technology and parental engagement in children's education at home, and (5) the effects of parental confidence in using technology on parental engagement in remote learning.

The results can be summarized as follows. The number of electronic devices at home varied significantly between countries, as did the percentage of households with a computer per child (higher in the United States and lower in Ghana, Tanzania and Zanzibar, and Pakistan, for example). Except in some African and South Asian countries, internet access and speed were typically satisfactory. In all countries, the majority of parents taught a child at home during school closures, although the percentages differed between countries (higher in India and Tanzania and Zanzibar and lower in Chile, El Salvador, and Japan). In all countries except for Pakistan, there was a statistically significant relationship between parental engagement in children's education at home and parental confidence in using technology. This relationship remained significant (again, in all countries except for Pakistan) even after controlling for parent and child demographic characteristics such as gender, age, socioeconomic status, siblings, and living arrangements.

This study had a few limitations. First, data were obtained from people with internet access because data collection took place during the COVID-19 pandemic. Second, data were collected using snowball sampling instead of random sampling. Third, the countries studied might not be representative of all countries. Finally, the questionnaire did not always consider countries' specific contexts. For example, some questions about checking schools' online platforms and presenting digital content might have been difficult to answer in middle- and low-income countries, as the majority of schools in these countries do not have online platforms or portals due to the limited internet access.

Although there were limitations, this study analyzed a significant dataset collected from 19 countries, showing the impact of parental confidence in using technology on parental engagement in children's remote learning. These results

contribute to the discussion on education and school closures during the COVID-19 pandemic.

**Supplementary Information** The online version contains supplementary material available at <https://doi.org/10.1007/s43545-023-00672-0>.

**Acknowledgements** I would like to thank Dr. Andres Sandoval-Hernandez and Dr. Eliana Maria Osorio-Saez at the University of Bath, United Kingdom, who led the data collection for this research.

**Author contributions** The author wrote all the content in the manuscript.

**Funding** This study received no funding.

**Data availability** The datasets analyzed in this study are available online. See: Osorio-Saez EM, Eryilmaz N, Sandoval-Hernandez A et al. (2020) Data on the impact of COVID-19 on parental engagement across 23 countries. Mendeley Data, V2. <https://doi.org/10.17632/kvvdgvs8zs.2>.

## Declarations

**Conflict of interest** I have no conflicts of interest to disclose.

**Ethical approval** Ethical approval for this research has been confirmed by Dr. Andres Sandoval-Hernandez and Dr. Eliana Maria Osorio-Saez at the University of Bath, United Kingdom. In addition, all researchers and educational officers who participated in the research confirmed ethical approval.

**Informed consent** All participants agreed to participate in the research.

## References

- Ali Z, Ishak AN (2020) COVID-19: a summative content analysis about challenges, influence and effect of home-schooling. *Int J Hum Technol Civiliz* 1(9):92–108
- Bayrakdar S, Guveli A (2020) Inequalities in home learning and schools' provision of distance teaching during school closure of COVID-19 lockdown in the UK. ISER Working Paper Series 2020–09, Institute for Social and Economic Research, Essex, UK
- Briggs DC (2020) COVID-19: the effect of lockdown on children's remote learning experience—parents' perspective. *J Educ Soc Behav Sci* 3(9):42–52. <https://doi.org/10.9734/jesbs/2020/v33i930257>
- Dimopoulos K, Koutsampelas C, Tsatsaroni A (2021) Home schooling through online teaching in the era of COVID-19: exploring the role of home-related factors that deepen educational inequalities across European societies. *Eur Educ Res J* 20(4):479–497. <https://doi.org/10.1177/14749041211023331>
- Engzell P, Frey A, Verhagen MD (2021) Learning loss due to school closures during the COVID-19 pandemic. *Proc Natl Acad Sci* 118(17):e2022376118. <https://doi.org/10.1073/pnas.2022376118>
- Fontenelle-Tereshchuk D (2021) 'Homeschooling' and the COVID-19 crisis: the insights of parents on curriculum and remote learning. *Interchange* 52:167–191. <https://doi.org/10.1007/s10780-021-09420-w>
- Garen AG, Evaristo FA, Ang-See C (2021) Parental engagement in children's online learning: views, practices, and experiences. In: Paper presented at the DLSU Research Congress, De La Salle University, Manila, Philippines, 7–9 July 2021
- Goodall J, Vorhaus J (2011) Review of best practice in parental engagement. Research Report RR156, Department for Education, London
- Häkikilä J, Karhu M, Kalving M, Colley A (2020) Practical family challenges of remote schooling during COVID-19 pandemic in Finland. In: Proceedings of the 11th Nordic Conference on Human-Computer Interaction: Shaping Experiences, Shaping Society, Tallinn, Estonia, 25–29 Oct 2020, pp 1–9. <https://doi.org/10.1145/3419249.3420155>

- Laxton D, Cooper L, Younie S (2021) Translational research in action: the use of technology to disseminate information to parents during the COVID-19 pandemic. *Br J Edu Technol* 52(4):1538–1553. <https://doi.org/10.1111/bjet.13100>
- Lewin C, Luckin R (2010) Technology to support parental engagement in elementary education: lessons learned from the UK. *Comput Educ* 54(3):749–758
- Maldonado JE, De Witte K (2021) The effect of school closures on standardised student test outcomes. *Br Edu Res J* 48(1):49–94. <https://doi.org/10.1002/berj.3754>
- Nayir F, Sari T (2021) Identifying parents' home-schooling experience during Covid-19 period. *Asian J Distance Educ* 16(1):156–170
- NIER (National Institute for Educational Policy Research) (2019) OECD Seitono Gakusyutotsudochosa (PISA [Programme for International Student Assessment]): 2018nenchosahosokushiryō. NIER, Tokyo
- Novianti R, Garzia M (2020) Parental engagement in children's online learning during COVID-19 pandemic. *J Teach Learn Element Educ* 3(2):117–131. <https://doi.org/10.33578/jtlee.v3i2.7845>
- OECD (Organisation for Economic Cooperation and Development) (2020) Combatting COVID-19's effect on children. OECD, Paris
- Osorio-Saez EM, Sandoval-Hernandez A, Eryilmaz N, Kameshwara KK (2020b) ICIPES 2020 user guide for the international database. University of Bath, Bath
- Osorio-Saez EM, Eryilmaz N, Sandoval-Hernandez A et al (2021) Survey data on the impact of COVID-19 on parental engagement across 23 countries. *Data Brief* 35:106813. <https://doi.org/10.1016/j.dib.2021.106813>
- Osorio-Saez EM, Eryilmaz N, Sandoval-Hernandez A et al (2020a) Data on the impact of COVID-19 on parental engagement across 23 countries. Mendeley Data, V2. <https://doi.org/10.17632/kvvdgvs8zs.2>
- UNESCO (United Nations Educational, Scientific, and Cultural Organization) (2011) International Standard Classification of Education (ISCED) 2011. UNESCO Institute for Statistics, Montreal
- UNESCO (2021a) Global Monitoring Report 2021/2: non-state actors in education: who chooses? Who loses? UNESCO, Paris
- UNESCO (2021b) Total duration of school closures. <https://en.unesco.org/covid19/educationresponse>. Accessed 19 Jan 2022

Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.