Distance education in COVID-19 pandemic: An evaluation of parent's, child's and teacher's competences

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Abstract

COVID-19 has caused profound changes in various dimensions of people's lives. Education system is one of the areas affected most; and there have been profound changes mainly with regard to teachers, students and parents. The main purpose of this research is to analyse the effects of COVID-19 pandemic on ICT competences and experiences of classroom teachers and parents in various dimensions. Scales were developed to collect data for the research. The reliability of the scale was examined by calculating Cronbach Alpha coefficients; which were .690 and .793 for the Distance Education and Pandemic Scale; respectively. In the second study a total of 1345 people participated in the study, including 841 classroom teachers and 504 parents whose children attending primary schools. The findings of the second study revealed significant differences between teachers and parents. Based on the findings of the current study, following suggestions could be given; both parents and teachers should be informed and educated about ICT usage. Teachers should use digital applications like Web 2.0 tools which will direct them through interactive way of teaching.

Keywords COVID-19 pandemic · Distance education · Parents · Teachers · Communication technology

1 Introduction

COVID-19 has caused profound changes in various dimensions of daily life. Social distancing and issues related to distance between people have led to make new decisions. Social distancing has been considered as a precaution to reduce personal contact and it was anticipated to slow down transmission of virus where people would

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contact mostly. Consequently, the space among people increased and the frequency of contacts has decreased.

Since school environments are socially dense; and children and teachers interact with each other during class hours, education was one of the main dimensions that had to be taken into account seriously and as fast as possible at the beginning of the pandemic. All types of educational institutions are closed in many countries as well as in Turkey. Several activities are postponed or even cancelled. As a result of COVID-19, face to face education was given up. This has been regarded as an effective way for preventing the spread of any epidemic among students (Cowling et al., 2010; Jackson et al., 2013; Wu et al., 2010).

In Turkey, each level of education had postponed twice at the beginning and then, distance education has considered as the only solution for all levels of education for Spring term of 2019-2020 academic year. On March 23rd TV-based distance education has been launched for approximately 18 million primary, secondary and high-school students. This decision was given by Turkish government; and it was announced that this term would be completed with the advantage of distance education. Universities, on the other hand, have considered their own way while deciding which technology to be used for distance education (Adobe Connect, Zoom, etc.) and other educational levels' distance education has been conducted with Education Informatics Networks (Eğitim Bilişim Ağı [EBA]). Actually, EBA was first established in 2011-2012 academic year for presenting course materials that would be used on interactive whiteboard and tablets for FATİH project. It included online course materials, nevertheless during this pandemic process three TV channels for primary, middle and high schools courses have been established. In this pandemic process, although courses are given on EBA TV for different grades in Turkey, teachers have chance to use EBA online and invite their students to their courses.

Teachers, students and parents were confronted with an entirely new situation after this pandemic (Huber & Helm, 2020). Teachers, parents and students have faced various problems during pandemic. For instance, both parents and teachers had to encourage children for continuing their education on TV or on online. Teachers had to conduct all their online teaching activities with their existing skills; hence, they suffered from lack of sufficient materials, technical support and time to conduct online teaching activities (Stone & Springer, 2019; Nuere & de Miguel, 2020). In addition, teachers' distance education skills are very significant for making a smooth transition to the learning process just after the spread of COVID-19 across the world (Alexander et al., 2020a, 2020b; Ting et al., 2020). Moreover, Bakker and Wagner (2020) stated that many colleagues from various countries worry about the inequality between students as all students couldn't have the chance to access the resources and engage in online education. DeWitt (2020), for instance, surveyed 100 K-12 students in various countries and the results revealed that students explained the same issues regardless of their country of origin. One of the issue reported in this study are as follow: they generally didn't have access to laptop and they struggled with virtual learning, etc. Students' having access to technology as well as internet, teachers' knowledge about using technological tools for instruction aligned appropriate to curriculum, and parents' or other caregivers' skills and sufficiency to support and oversee their children during distance learning are other issues determined as a result of this pandemic process (Scher,

2020). UNESCO (2020b) also emphasized that students attended distance learning in hard circumstances like not having enough support and getting real teaching from their teachers. In Kyodo News (2020), it has been mentioned that there has been an impact on students' learning outcomes as well. Therefore, if school community and parents support students, they could complete their courses (Simons et al., 2020). (Iivari et al., 2020) as well mentioned that students who have been supported by their parents about technical problems could be more successful.

The psychological effects of COVID-19 on students form another concern. UNESCO (2020a) suggested five tips to help children to continue their education while they are at home. These tips were planning a routine together, having open conversations, beginning with shorter learning sessions and making them longer step by step, protecting children from the possible risks of online platforms, and the need for parents' staying in touch with their children's education facility. There have been studies carried out about psychological issues students encountered. For instance, psychological aspect of COVID-19 on college students was investigated by Cao et al. (2020), and it was found that economic effects, effects on daily life, and delays in academic activities affected participants' anxiety symptoms and on the other hand, social support decreases the level of anxiety. Huang et al. (2020) determined that nursing college students had also experienced anxiety due to COVID-19. College students encounter psychological challenges that lead them to poor mental health (Zhai & Du, 2020). In another study about distance learning which was conducted before COVID-19 spread, Ozaydın et al. (2018) found out that technical challenges had a negative influence on students' motivation and learning, too. These studies are conducted with college or university students, and there is still a need to find out the effects on primary, middle and higher school students' psychological status.

Another challenge teacher face is the lack of competence in using ICT, which has intensified during COVID-19 process. It is defined as a major tool for building knowledge societies (UNESCO, 2003). Commission of the European Communities (2001) also mentioned in eLearning Action Plan that improving the quality of learning by facilitating access to resources and services as well as remote exchange and collaboration. Also in European Commission's Action Plan (European Commission, 2018), it is stated that educational institutions should better adapt both life and work in the digital age by using technology in teaching and learning processes, developing digital competences and skills, and improving education for better data analysis and foresight. In this respect, teachers generally have basic skills to work remotely but they still need support regarding ICT issues. The usage and adaptation of ICT to instructional process generally depends on teachers' knowledge, motivation, and their personal skills. Therefore, teachers should have enough knowledge about ICT and could use these technologies during their lessons.

ICT has become one of the basics of the education such as reading, writing, and maths (Anderson et al., 2002). ICT integration to various courses has been studied. For instance, students retained math skills long after usage of ICT, they showed less math anxiety and perceived the subject as relevant to daily life (Sivakova et al., 2017). Specifically there are five opportunities to use ICT in mathematics (Sivakova et al., 2017); learning feedback, exploring data, developing visual imagery, observing and seeing patterns and their relations, and teaching with computer. There are also studies about teachers' use of ICT in their teaching and learning processes. According to N. Davis et al. (2009), teachers' training processes should help them integrate

technology in their instructional process. Internet should be used as a learning tool for developing training activities as a supplementary at school, for facilitating personal contacts, and for increasing access to content and services (Sangra, 2001). Ertmer (2005) also suggested that teachers' pedagogical beliefs are likely to impact their classroom practices. Moreover, the understanding of ICT and the criterion for the selection of ICT affect directly the process of implementing distance education (Jatileni & Jatileni, 2018). These issues have become crucial during the pandemic.

During this process, teachers were also forced to use various digital tools and resources for solving problems and to implement new approaches to instructional process (Eickelmann & Gerick, 2020). In other studies, like Garzón Artacho et al. (2020)'s study, it is indicated that teachers had various ICT related challenges; and specifically as mentioned in Trust and Whalen (2020)'s study that most teachers had never taught online before the COVID-19 pandemic. Moreover, Stone and Springer (2019) stated that teachers needed different teaching and learning approaches and skills in distance education. As a result, teachers who were experienced in technology and used it frequently beforehand, could easily adapt to distance education (Alea et al., 2020a, 2020b; Trust & Whalen, 2020).

When these studies are considered altogether, main purpose of this research was to analyse the effects of COVID-19 pandemic process of ICT competences and experiences of classroom teachers and parents in various dimensions. To this end, two separate studies were done in this research. In the first one;

We aimed to develop a scale for evaluating parents' attitude about distance education and pandemic process.

In the second one, we aimed to answer following research questions;

- Is there any relationship between distance education and pandemic based on children's (a) gender and (b) age,
- Is there any relationship between distance education and pandemic and the educational level of parents,
- How do classroom teachers' ICT competences vary based on (a) gender, (b) years of teaching experience, (c) daily use of ICT tools,
- What are the classroom teachers' and parents' ICT experiences,
- What are the influences of COVID-19 pandemic on children (ICT experiences of classroom teachers during their mathematics lessons).

2 Study 1: Distance education and pandemic scales development process

As the first step for both scales, 11 field experts examined the Scope Validity Ratios (SVR) using the Davis technique. Based on the experts' opinion, each scale item was rated as (a) appropriate, (b) the item needs minor revisions, (c) the item needs major revisions, or (d) inappropriate. In this technique, the number of experts rating the items as (a) and (b) is divided by the total number of experts to obtain the Scope Validity Ratio (SVR) for each item. Any item with SVR below 0.80 is removed from the scale (Davis, 1992). Accordingly, the item number of the Distance Education

Scale dropped from 16 to 15 with the overall SVT of .92; and the item number of the pandemic scale, decreased from 17 to 12 with the overall SVT of .86.

2.1 Method

Exploratory Factor Analysis (EFA) was first performed with 325 participants for the "Distance Education Scale" and "Children's Response to the Pandemic". Kaiser-Meyer-Olkin (KMO) coefficient and Bartlett Sphericity Test were used to determine whether the data were suitable for factor analysis. As one of the vertical rotation methods, Varimax method was used for exploratory factor analysis. Then Confirmatory Factor Analysis (CFA) performed. For the Confirmatory Factor Analysis (CFA), the data were collected from 515 participants.

2.2 Exploratory factor analysis

The Kaiser-Meyer-Olkin (KMO) coefficient was calculated and Bartlett Sphericity Test was performed in order to determine the suitability for the Exploratory Factor Analysis for the validity of the scales. The results are presented in Table 1.

As presented in Table 1, for the Distance Education Scale (DES), KMO coefficient was 0.787 and Bartlett's Sphericity value was $X2 = 993.981$ ($p < .001$). For the Pandemic Scale, KMO coefficient was 0.782 and Bartlett's Sphericity value was $X2 = 828.303$ ($p < .001$). In order to perform factor analysis, the KMO coefficient should be at least .60 and the result of the Bartlett Sphericity Test should be significant (Field, 2013; Tavşancıl, 2002). While determining factor load values, 0.40 was set as the criterion value; the load values below which were ignored. The sample size should be at least 200 in order for an item with a factor load value of 0.40 to remain in the scale (Leandre et. al., 2012).

After rotating the Distance Education Scale (DES), 3 factors with eigenvalues greater than 1 were taken into account. 6 items were identified as overlapping in more than one factor, had a low item factor load, and negatively affected the total explained variance. These items were 1, 3, 5, 6, 8, and 15 ones. By removing these items, the number of the items in the Distance Learning Scale (DES) decreased from 15 to 9. The KMO value for the remaining 9 items was 0.747, and the Bartlett's Sphericity value was $X^2 = 472.225$ ($p < .001$). Hence, the Distance Education Scale was finalized with a 3-factor structure, including 9 items, with an eigenvalue greater than 1. In addition, the measuring tool explained

Table 1 KMO Coefficient and Bartlett Sphericity Test results

KMO Coefficient		Distance Education	Pandemic
		0.787	0.782
Bartlett's Sphericity	Chi-Square Value	993.981	828.303
	df	105	66
	p	0.000	0.000

Table 2 Factors and load values of post-rotation distance education and pandemic scales

Items	DES Factor 1	DES Factor 2	DES Factor 3	Pandemic Factor 1	Pandemic Factor 2	Items
D4	.744			.840		P9
D2	.734			.703		P10
D7	.656			.641		P8
D14	.602			.580		P2
D10		.756		.415		P4
D13		.715			.778	P3
D9		.598			.756	P7
D11			.828		.587	P11
D12			.780		.586	P1
Eigen values	1.978	1.634	1.601	2.254	2.104	Eigen values
Variance Ratios (%)	21.973	18.153	17.793	25.039	23.375	Variance Ratios (%)
Cumulative Variance (%)	21.973	40.126	57.919	25.039	48.414	Cumulative Variance (%)

51.91% of the total variance. Post-rotation factor loads, and variance ratios of both scales are given in Table 2.

After rotating the Pandemic Scale, three factors with eigenvalues greater than 1 were taken into account. Three items were identified as overlapping in more than one factor, had a low item factor load, and negatively affected the total explained variance. These items were 5, 6, and 12. By removing these items, the number of the items in the Pandemic Scale decreased from 12 to 9. The KMO value for the remaining 9 items was 0.777, and the Bartlett's Sphericity value was $X^2 = 568.157$ ($p <.001$). Hence, the Pandemic Scale was finalized with a 2-factor structure, including 9 items, with an eigenvalue greater than 1. In addition, the measuring tool explained 48.41% of the total variance.

Post-rotation factor loads, and variance ratios of both scales are given in Table 2.

After Varimax rotation, the factor load values of the remaining items were 0.45 or higher, which is considered a good measure according to Büyüköztürk (2007).

Yet, it is also stated in the relevant literature that items with factor loads above 0.30 can also remain in the scale. The total explained variance is acceptable to be between 40% and 60% (Tavşancıl, 2002).

2.3 Naming the factors

After determining the variables and items in the factor, naming the factors is started (Karagöz & Kösterelioğlu, 2008). While naming the factors, their meanings are taken into consideration (Yalçın et al., 2019). Considering the content of the items, the following names seemed appropriate.

2.4 Distance education scale

2.4.1 Factor 1- Lessons

Item 4: Does your child complain about the training provided by distance education?

Item 2: Is your child worried about his/her academic success due to distance education?

Item 7: Do you think you are incapable of helping your child in his/her homework?

Item 14: Compared to the past, do you think you have more difficulty with your child's lessons and assignments during the quarantine period?

Considering these items, Factor 1 seemed to be mainly focusing on the children's lessons. Therefore, the first factor was named "**lessons**".

2.4.2 Factor 2- Parents

Item 10: Do you make an effort to increase the motivation of your child for studying?

Item 13: Is your child's academic performance important to you right now?

Item 9: Do you remind or warn your child to study and do his/her homework?

Considering these items, Factor 2 seemed to be mainly focusing on the parents. Therefore, the second factor was named "**parents**".

2.4.3 Factor 3- Technology

Item 11: Compared to the past, do you think your child spends more time watching videos on technological devices (computer, TV, tablet, smartphone, etc.) due to the pandemic?

Item 12: Do you feel the need to warn your child more than before to stop watching videos?

Considering these items, Factor 3 seemed to be mainly focusing on the time children spend with technological devices. Therefore, the third factor was named "**technology**".

2.5 Pandemic scale

2.5.1 Factor 1- Psychology

Item 9: Does he/she have temper tantrums?

Item 10: Has he/she become petulant or choleric recently?

Item 8: Does he/she refuse to sleep alone?

Item 2: Does he/she have symptoms such as loss of appetite, abdominal pain, headache, etc.?

Item 4: Does he/she talk about nightdreams about this event?

Considering these items, Factor 1 seemed to be mainly focusing on the psychological behavior of the children. Therefore, the first factor was named "**psychology**".

2.5.2 Factor 2- Pandemic

Item 3: Does your child frequently talk/ask questions about the pandemic?

Item 7: Does he/she precisely follow and listen to the news about the pandemic?

Item 11: Does he/she seem to be obsessed about hygiene?

Item 1: Have you noticed an increase in fear-, anxiety- or distress-related symptoms in your child?

Considering these items, Factor 2 seemed to be mainly focusing on the pandemic itself. Therefore, the second factor was named "**pandemic**".

2.6 Confirmatory factor analysis

For the Confirmatory Factor Analysis (CFA), the data were collected from 515 parents. Before the modifications proposed in the confirmatory factor analysis were carried out, the fit indices for the Distance Education Scale were: [$\chi2/sd = 6.730$ ($p = .000$); GFI = 0.933; RMSEA = 0.106; SRMR = 0.0726; CFI = 0.825]. As a result of the analysis, 3 modifications were proposed between item 2 and 4; item 2 and 14;

Table 3 Fit indices and reference values calculated for the Distance Education Rating Scale

Fit indices	Good fit	Acceptable	Calculated	Result
CMIN/SD	$0 \leq \chi 2/sd < 2$	$2 \leq \chi 2/sd \leq 5$	3.034	Acceptable Fit
RMSEA	$0 < RMSEA < .05$	$.05 \leq RMSEA \leq .10$	.063	Acceptable Fit
SRMR	$0 \leq SRMR < .05$	$.05 \leq SRMR \leq .10$	.0498	Good Fit
GFI	$.95 \leq GFI \leq 1.00$	$.90 \leq GFI \leq .95$	.975	Good Fit
CFI	$.95 \leq CFI \leq 1.00$	$.90 \leq CFI \leq .95$	.946	Acceptable Fit

and item 10 and 13. The fit indices and reference values of the scale after the necessary modifications are given in Table 3.

Before the modifications proposed in the confirmatory factor analysis were carried out, the fit indices for the Pandemic Scale were: [$\chi 2/sd = 5.903$ ($p = .000$); GFI $= 0.936$; RMSEA $= 0.098$; SRMR $= 0.0632$; CFI $= 0.881$]. As a result of the analysis, 3 modifications were proposed between item 9 and 10; item 7 and 11; and item 3 and 7. The fit indices and reference values of the scale after the necessary modifications are given in Table 4.

2.7 Reliability results

The Cronbach's Alpha coefficients for the Distance Education Scale were as follows: .637 for the "Study" subscale; .537 for the "Parents" subscale; .702 for the "Technology" subscale, and .690 for the total scale. The Cronbach's Alpha coefficients for the Pandemic Scale were as follow: .739 for the "Psychology" subscale; .690 for the "Pandemic" subscale; and .793 for the total scale. So, it can be said that both scales are reliable tools.

2.8 Results

After the exploratory factor analysis, items 1, 3, 5, 6, 8, and 15 were removed from the Distance Education Scale and acceptable values were obtained (KMO = .747, $x^2 = 472.225$, $p < 0.01$). As a result of the analysis, the scale was finalized including 9 items in 3 subscales that explained 51.91% of the total variance. Similarly, items 5, 6, and 12 were removed from the Pandemic Scale and acceptable values

Table 4 Fit indices and reference values calculated for the Pandemic Scale

Fit indices	Good fit	Acceptable	Calculated	Result
CMIN/SD	$0 \leq \chi 2/sd < 2$	$2 \leq \chi 2/sd \leq 5$	3.326	Acceptable Fit
RMSEA	$0 < RMSEA < .05$	$.05 \leq RMSEA \leq .10$	.067	Acceptable Fit
SRMR	$0 \leq SRMR < .05$	$.05 \leq SRMR \leq .10$	.0399	Good Fit
GFI	$.95 \leq GFI \leq 1.00$	$.90 \leq GFI \leq .95$	.968	Good Fit
CFI	$.95 \leq CFI \leq 1.00$	$.90 \leq CFI \leq .95$	.950	Good Fit

were obtained (KMO = .777, x^2 = 568.157, p < 0.01). As a result of the analysis, the scale was finalized including 9 items in 2 subscales that explained 48.41% of the total variance.

Fit indices were examined to determine whether the model created by confirmatory factor analysis was compatible with the data. After ensuring the compliance of the items, 3 modifications were detected between item 2 and 4, item 2 and 14, and item 10 and 13 in the CFA of the Distance Education Scale. After making the necessary modifications, fit index values were as follow: [$\chi2/sd$ = 6.730 (p = .000); GFI = 0.933; RMSEA = 0.106; SRMR = 0.0726; CFI = 0.825]. As a result of the CFA for the Pandemic Scale, 3 modifications were detected between item 9 and 10, item 7 and 11, and item 3 and 7. After making the necessary modifications, fit index values were as follow: [$\chi2/sd$ = 5.903 (p = .000); GFI = 0.936; RMSEA = 0.098; SRMR = 0.0632; CFI = 0.881].

As the last step, the reliability of the scales was examined by calculating Cronbach Alpha coefficients as .690 and .793 for the Distance Education and Pandemic Scales respectively. Thus, both scales were found to be reliable tools (Büyüköztürk, 2007; Tabachnick et al., 2007).

3 Study 2: Applications of the scales and experiences of the participants

3.1 The participants

A total of 1345 people participated in the study, including 841 classroom teachers and 504 parents whose children attend primary schools. Demographic data of the participants is given in Table 5.

3.2 Method and instruments

As one of the quantitative research methods, descriptive method is used in the present study. In order to examine the relationship between two or more variables and to collect data about the causes and effects of the phenomenon, a descriptive study uses both correlations and screening (Büyüköztürk et al., 2017). Carried out on a sample representing the universe, a screening study investigates the attitudes, tendencies and dispositions of the universe quantitatively or numerically (Creswell,

Table 5 Demographic information of the groups

Gender				
		Female	Male	Total
Teacher	F	515	326	841
	%	61.2	38.8	100
Parent	F	388	116	504
	%	77.0	23.0	100

2014). In this study, the perspectives of the parents regarding their children's distance education during the pandemic, the psychological aspects of the children in this period, and the teachers' ability to use ICT tools were examined and the relationship between them was studied. For statistical analysis, SPSS package program v25.0 was used. First, the results obtained from the Kolmogorov-Smirnov normality test were examined and it was observed that the data showed a normal distribution. In addition, when the Q-Q Plot and Histogram graphs and the standardized skewness-kurtosis coefficients, which are standardized by dividing them into their standard errors, were examined, it was found that the data were normally distributed since they were in the ± 1.96 value range (George & Mallery, 2010; Mishra et al., 2019; Tabachnick & Fidell, 2013). Since the data showed normal distribution, t test was used in cases with two independent variables, and One-Way Analysis of Variance (ANOVA) was used in cases with more than two independent variables.

3.3 Findings

This section includes the data collected from parents, children, and teachers through Distance Education Evaluation Scale, Children's Response to Pandemic Scale, and Technology Acceptance Scale (Ursavaş, 2014), respectively. For ease of use, the following abbreviations are used in the tables: "DES" for the "Distance Education Evaluation Scale"; "Pandemic" for the "Children's Response to Pandemic Scale"; and "ICT" for "Information and Communication Technologies".

Table 6 shows the results of the t test conducted to determine the relationship between the children's gender and the DES and Pandemic scale.

There was no significant difference in any of the scales ($p > 0.05$).

Table 7 shows the ANOVA results conducted to determine the relationship between the children's age, the DES and the Pandemic scale.

There was no significant difference in any of the scales ($p > 0.05$). In other words, age was not a predictor for distance education and response to pandemic scales.

Table 8 shows the ANOVA results conducted to determine the relationship between the educational level of the mothers and the DES and Pandemic scale.

There was no significant difference in any of the scales ($p > 0.05$). In other words, mothers' level of education was not a predictor for distance education and response to pandemic scales.

Table 6 T test results according to the gender variables of the children		Variable	F	$\overline{X}$	sd	df	t	p
	DES	Girl	278	32.10	4.962	502	-.609	.543
		Boy	226	32.37	5.002			
	Pandemic	Girl	278	21.81	6.725	502	.610	.542
		Boy	226	21.46	6.103			

p<.05

Table 7 ANOVA results according to the age variables of the children

	Age	F	$\overline{X}$	sd	df	F	p
DES	7 years old	156	31.81	4.990	3	.591	.621
	8 years old	150	32.31	4.764			
	9 years old	98	32.35	5.145			
	10 years old	100	32.61	5.132			
Pandemic	7 years old	156	22.16	6.948	3	1.389	.245
	8 years old	150	21.20	6.033			
	9 years old	98	20.87	6.351			
	10 years old	100	22.31	6.304			

$^*p<.05$

Table 9 shows the ANOVA results conducted to determine the relationship between the educational level of the fathers and the DES and Pandemic scale.

According to the table, a significant difference was found in the DES (F_{498} = 2.971, $p < 0.05$) in relation to the education level of the fathers. In other words, the educational status of the father had an effect on the distance education of the children. Bonferroni test was applied to determine the source of this difference. The difference was between the fathers who were primary school graduates ($\overline{X} = 33.36$) and those with bachelor's degrees ($\overline{X} = 31.52$), in favor of the latter.

Table 10 shows the relationship between ICT skills and the gender of the teachers.

A significant difference was found in ICT skills according to gender (t_{839} = -2.076, p < 0.05). Further investigation revealed that male teachers had higher levels of skills in using ICT than female teachers.

Table 11 shows the ANOVA results conducted to determine the relationship between the teachers' ICT skill levels and the years of experience in their profession.

A significant difference was found in the ICT skills of the teachers (F_{836} = 3.593, $p < 0.05$). LSD test, one of the Post-Hoc tests, was applied to determine the source of the difference. According to the results, teachers with 0-5 years of

Table 8 ANOVA results according to education variables of mothers of children

	Education Level	F	$\overline{X}$	sd	df	F	p
DES	Illiterate	64	33.35	5.358	498	1.613	.155
	Primary	135	32.75	5.042			
	Secondary	79	31.91	5.051			
	High	80	31.70	4.930			
	University	134	31.76	4.594			
	Postgraduate	12	30.91	5.468			
Pandemic	Illiterate	64	20.96	6.889	498	1.421	.215
	Primary	135	21.68	6.637			
	Secondary	79	21.17	5.902			
	High	80	22.41	6.772			
	University	134	21.42	5.953			
	Postgraduate	12	25.66	7.889			

$^*p<.05$

Table 9 ANOVA results according to education variables of fathers of children

	Education Level	F	$\overline{X}$	sd	df	F	p	Difference
DES	Illiterate	14	32.14	5.802	498	2.971	.012*	Primary> University
	Primary	107	33.36	4.510				
	Secondary	91	33.07	5.031				
	High	105	31.78	5.245				
	University	159	31.52	5.021				
	Postgraduate	28	30.78	3.764				
Pandemic	Illiterate	14	19.57	7.552	498	.987	.425	
	Primary	107	22.09	6.820				
	Secondary	91	21.26	6.003				
	High	105	21.85	6.828				
	University	159	21.32	5.992				
	Postgraduate	28	23.42	6.892				

*$p<.05$

experience had a lower average than teachers with 6-11 years and 12-17 years of experience. In addition, teachers with more than 24 years of experience had a lower average than all other teachers.

Table 12 shows the ANOVA results conducted to determine the teachers' daily usage of electronic devices such as smartphones, tablets, PCs, etc. during the pandemic.

A significant difference was found in the frequency of using ICT technologies during the pandemic ($F_{836} = 7.185$, $p < 0.05$). The Bonferroni test, one of the Post-Hoc tests, was conducted to determine the source of the difference. According to the results, teachers using ICT technologies for more than 4 hours per day had a higher average than those using ICT for less than 4 hours.

3.4 Qualitative comparison

Based on the collected feedbacks, teachers were concerned about parents' inability in using distance education effectively. In response to the question regarding whether the teachers faced any difficulties during distance education period, one teacher replied: *"Parents and students have difficulties in logging on to the system and the distance education system is not well understood by the parents."* Another teacher wrote: *"Yes, most of the students and parents are inadequate in this regard.*

Table 10 ICT use skills T test results of teachers according to their gender

	Variable	F	$\overline{X}$	sd	df	t	p
ICT	Female	515	144.42	17.930	839	-2.076	.038*
	Male	326	147.09	18.659			

*$p<.05$

Table 11 ANOVA results of teachers' ability to use ICT according to the year of experience variable

	Years of Experience	n	$\overline{X}$	s.d	df	F	p	Difference
ICT	0-5 years	418	144.26	17.772	836	3.593	.006[*]	A<B, C
	6-11 years	180	147.08	18.270				E<B, C, D
	12-17 years	122	148.52	18.242				
	18-23 years	67	147.43	18.366				
	24 years and above	54	139.88	20.224				
	Total	841	145.45	18.252				

*$p<0.05$; A = 0-5 years; B = 6-11 years; C = 12-17 years; D = 18-23 years; E = 24 years and above

Participation in live lessons is very low." Another teacher said, *"I cannot get feedback from my students. The parents were not fully engaged in school activities even in normal times, now they do not even answer our phone calls. The distance education deepened the gap between parents and teachers."* However, one teacher said, *"Parents who can effectively use the system find distance education useful".* Likewise, another teacher said, *"I get positive feedback. Parents are satisfied with the attention and care we offer to the students. We do online lessons for at least 1.5 hours every day and we are now catching up. This reassures the parents and takes the load off their mind."*

The teachers stated that they had difficulty in communicating with the parents in some cases; in other cases, however, the communication was quite easier. It seems that the teachers who used the ICT more effectively were capable of managing the process better than others. Thus, providing adequate ICT training for teachers can enable them to handle the process more efficiently. However, as this process does not include only the teacher, parents should also be trained and supported.

One of the feedbacks from the parents was *"My son was already having difficulties in face-to-face lessons. The distance education has worsened the situation and left me with a lot of trouble. He does not want to study."* Another parent said, *"The whole process of teaching and learning gets difficult with distance education. Being at home takes away the sense of responsibility from the students; whereas going to school and attending lessons in classrooms bring about liability, commitment,*

Table 12 ANOVA results regarding the frequency of daily use of ICT tools by teachers during the pandemic process

	Hours of use	n	$\overline{X}$	sd	df	F	p	Difference
ICT	Under 1 hour	149	142.66	16.862	836	7.185	7.185[*]	E> A, B, C, D
	1-2 hours	260	144.10	17.686				
	2-3 hours	222	144.98	17.904				
	3-4 hours	103	145.19	18.720				
	4 hours and above	107	153.88	19.626				
	Total	841	145.45	18.252				

*$p<0.05$; A = Under 1 hour; B = 1-2 hours; C = 2-3 hours; D = 3-4 hours; E = 4 hours and above

and amenability." None of the parents stated any shortage or problem caused by the teachers. Teachers have problems using online teaching systems. As they try to continue teaching using the traditional methods, the students lose their interest and attention.

3.5 ICT experiences of teachers and parents in mathematics

We asked the teachers how they used ICT for teaching mathematics and the problems they encountered. According to the answers, most of the teachers generally used ICT either for assigning "homework" or giving a "live lecture" for the mathematics. A teacher said, *"I use it to give lectures, share questions and quizzes, and create and share videos of relevant activities and games."* Another teacher said, *"I use it to assign homework. If the topic of the day is geometry, for instance, I upload a video about geometric shapes."* Unlike other participants, one teacher said, *"I prepare math games using Web 2.0 tools for my students to repeat the new lessons."* Many teachers also mentioned that while using ICT tools for mathematic lessons, they mostly try to find ways that can attract students' attention.

Regarding the difficulties they encountered during the pandemic, many teachers stated that they had problems originating from the internet connection. As a hindering factor, one teacher said, *"In ICT platform, you cannot do mathematical operations, such as division."* Another teacher explained his concern about overusing ICT for mathematics and said, *"When it is used a lot, students get distracted."* In the majority of the feedback from the teachers, they mainly mentioned more about technical problems of the system than the problems experienced during mathematic lessons. Teachers with higher skills in using technological devices generally complained about technical problems, while teachers with low ICT skills mentioned the difficulty of performing mathematical operations.

4 Discussion and conclusion

COVID-19 has led changes in education systems and these changes affect mainly teachers, students and parents. Distance education and as a result the ICT usage appear to overcome the difficulties faced by them. Hence, in the current study it was aimed to analyse the effects of COVID-19 pandemic process on ICT competences and experiences of classroom teachers and parents. To this end classroom teachers' ICT competences, classroom teachers' ICT experiences during COVID-19 pandemic process, and ICT experiences of teachers during mathematics lessons were analysed. Parents' ICT competencies were determined and classroom teachers' and parents' ICT experiences were compared. Findings of the current study are both conflicting with and appropriate to current literature.

First of all, teachers' technical experiences is one of issues that affect instructional activities (Ko & Rossen, 2017; Watson, 2020) and teachers' confidence in their own basic technological skills promotes positive attitudes to online teaching (Tanhua-Piiroinen et al., 2020). Hence, teachers' ICT skills determine the quality

and success of distance education. Moreover, in current literature, the relationship between ICT usage and gender is frequently changing. There is a common understanding that technology is man's work or a male issue (Clegg, 2001). Van Dijk and Hacker (2003) mentioned that females use ICT significantly less than males. In schools, male teachers' ICT usage is higher than that of female teachers (Ilomäki et al., 2001). There were interesting findings of the current study about teachers. For instance, similarly male teachers' usage of ICT was higher than female ones. This finding is parallel with the current literature. Moreover, teachers, who had an experience between 6-11 years and between 12-17 years, indicated higher ICT usage. On the other hand, teachers with 24 years or higher years and teachers with lower than 6 years indicated less ICT competence. In the current literature it is stated that, for the success of online education, the teachers' awareness and comfort in online learning activities are critical (Kessler, 2006). For instance, Bailey and Lee (2020) found out that novice teachers without experience online teaching experience expressed frustration. In Jäger-Biela et al. (2020) study, it was found that novice teachers had specific and innovative opportunities to develop digital competence, so they are more competent in using digital tools. In the current study, only experienced teachers not specifically online education indicated higher ICT usage. Hence, there are both conflicting and parallel results of the current study with existing literature.

Participant teachers stated that parents could not use this distance education process effectively. For instance, teachers had problem in communicating with parents. Teachers specified that ICT usage would enhance distance education's quality. Besides, they added that parents should also be supported. Similar obstacles have been experiences in other countries as well. For instance, (Aliyyah et al., 2020) stated parents' low internet literacy and parents' decreasing support to their children's distance education affected children's learning technical obstacles, student conditioning, the participation of students, and online teaching experience as obstacles faced by Indonesian teachers. Also, they added that specifically students from low economic level faced more technical problems like parents' not having cell phones / laptops and poor internet signals. The findings of the current study are parallel with current literature and similar obstacles were also experienced by participant teachers.

This era is shaped by ICT; that is, its' role is increasingly prominent (Castells, 2000). Education as one of the areas has been affected by ICT since the context of teaching and learning through various devices, the usage of internet, and online learning environments have been changed (Selwyn et al., 2017). Stakeholders of education like teachers, students and parents are also influenced by these changes in varying degrees of integration of technology in educational systems (Starkey, 2020). About parents' gaining experience with usage of ICT, it would influence their support to their children (Stevenson, 2011). Firstly, the findings indicated that the ages of children were not affected by distance education and pandemic situation. Yet, the findings indicated while the educational level of mothers did not have an impact on children's distance education and pandemic situation, fathers' educational level is one of the issues that has an impact on distance education. Erdoğdu and Erdoğdu (2015) mentioned that the educational level of parents and students' performance were affected from each other. As Aliyyah et al.

(2020) mentioned if parents did not understand the subject matter, teachers' instructional process could not go as determined previously. Therefore, this finding of the current study presents both similarities and differences regarding the current literature.

Besides, parental support has a higher impact on students' learning outcomes (Desforges & Abouchaar, 2003; Goldman, 2005) and as well this support is a significant issue in their children's success in virtual learning environment (Makrooni, 2019; Woofter, 2019). On the other hand, parents had problems about their roles in their children's online learning (Murphy & Rodríguez Manzanares, 2009). Garbe et al. (2020) found out that balancing responsibilities, students' motivation, accessibility, and learning outcomes were the problems faced by parents during distance education after COVID-19 pandemic process. Likewise, in the current study there were also parents stating that they had difficulties regarding distance education.

When findings regarding mathematics lesson are considered, participant teachers generally used ICT for giving homework and doing online mathematics lesson, but they had internet problems which affected their mathematics lesson. Besides, only students with positive attitudes towards mathematics did their homework (Setua, 2020). In the current study, this was not the case instead students, who had chance to access ICT and who understood the subject matter, did their homework as participants mentioned. Teachers who had higher ICT skills complain about systematic problems while others who had less ICT skills complain about making mathematical operations through ICT tools. Therefore, teachers' ICT skills were determinant in distance education period during COVID-19 pandemic.

5 Suggestions for further studies

Based on the findings of the current study, following suggestions could be given;

- Parents and teachers should be informed and educated about ICT usage.
- Teachers should use digital applications like Web 2.0 tools which enable interactive way of teaching.
- School counsellor should be active in motivating parents for participating their children's distance education process.
- School counsellor should guide children and parents via online tools.
- Teachers should be careful in enriching their online mathematics lessons and in making their mathematics lessons appropriate to children's individual differences.

6 Limitations

Although this study provided important insights, it has some limitations that need to be addressed. Some of the limitations of the current study are as follow; the data were collected through online forms; this might affect the participants' answers due

to their ICT skills. Parents might have more than one child; while they were answering scales this issue might affect their answers.

Declarations

Conflict of interest No potential conflict of interest was reported by the author(s).

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