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Evaluations of Online Education Implementations From Students, Parents and Teachers Perspective During the Pandemic Period in Turkey

[1]Aysun İPEKOĞLU, Fadime ULUSOY[2]

[1]MEB, Ordu, TÜRKİYE
https://orcid.org/0000-0001-9738-0692
[2]Kastamonu Üniversitesi, Kastamonu, TÜRKİYE
https://orcid.org/0000-0003-3393-8778

Email:aysunipekoglu@gmail.com,fadime@kastamonu.edu.tr

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Abstract

This study focuses on the evaluations of middle school students, teachers, and parents with regards to online mathematics education during the Covid-19 pandemic in Turkey. Seven mathematics teachers, fifty-one students from the same middle school, and fifty-three parents of these students participated in this qualitative study. Three online questionnaires were created and used to obtain data. Based on the content analysis, the results show that the EBA content portal used during the pandemic was found beneficial for easy access to synchronous lessons and a variety of quality teaching and learning mathematical resources. All participants had both mathematical expectations (e.g. increasing (i) the quality/variety of mathematical resources, (ii) the number/duration of mathematics lessons and (iii) the quality of mathematics instruction) and non-mathematical expectations (e.g., eliminating technical problems in the portal, access to the portal without the Internet, technological support) form each other and the portal in the pandemic process. The majority of the participants preferred face-to-face math lessons due to various reasons. The evaluations obtained in this study can help instructional designers maintain and develop online education implementations targeting teachers, students, and parents.

Keywords: Covid-19; online education; school closure; mathematics; parents; teachers; students

Introduction

In March 2020, the World Health Organization declared Covid-19 a global pandemic. The Covid-19 pandemic has drastically influenced the educational systems worldwide. According to UNESCO (2020), more than 190 countries have temporarily closed all their schools to eliminate the rapid spread of Covid-19 viral infection. As a result, face-to-face classes at schools were replaced with online learning environments at home to maintain social distance between teachers and students. This educational shift has increased the necessity of accessing the Internet, technological equipment, and digital learning environments within education systems (Bozkuş, 2014; Selwyn et al., 2017; Starkey, 2020; Yates et al., 2020).

After China, Turkey was the second nation to announce national distance education because of the pandemic. The Ministry of National Education (MoNE) has started distance education for all education levels with the slogan "This is distance education, not a vacation" for the benefit of more than 18 million pupils two weeks after the first case emerged in Turkey. Ministry of National Education (MoNE) had begun in 2012 to prepare an online teaching platform Eğitim Bilişim Ağı (EBA, Educational Information Network, www.eba.gov.tr). The EBA platform uses ICT resources at any grade level to facilitate the availability and utilization of appropriate learning materials not only at school but also in all other settings, and to ensure the inclusion of technology into Turkish education (Fiş-Erümit, 2020). During the Covid-19 pandemic, mathematics teachers could access and give their students mathematical material that included lesson videos, unit summaries, exercises and tests via the EBA content portal. As of 27 April 2020, teachers have launched synchronous (online) lessons daily five days a week for all students at separate times for each grade level through the portal.

However, the unplanned and extensive shift from offline to online learning and teaching has put a great deal of pressure on students, parents and especially teachers by the use of emerging technology that students are unfamiliar with (Khlaif & Salha, 2020). Thus, they have needed to know how to use technology in an efficient way and the ways to overcome challenges in online learning (Khlaif et al., 2020; McMahon et al., 2020). However, there is little time to overcome the immediate problems with the rapid transition of educational activities. For example, the lack of high-speed Internet at home and electronic devices (e.g., laptops, computers) or lack of technological literacy made it difficult to stream and disseminate online lessons particularly in the countryside (Bokayev et al., 2021). Moreover, a double burden was assigned to parents in terms of doing daily professional responsibilities and helping the educational activities of their children. For this reason, parents have no simple solution for their increasing responsibilities when working from home during the working day.

The Covid-19 pandemic has changed teaching and learning over the world dramatically and people have begun to rely on technology to conduct lectures and other teaching and learning activities. In such a circumstance, documenting students', parents' and teachers' experiences may thus help understand them and find effective approaches to these rapid changes (Khirwadkar et al., 2020). Furthermore, the presentation of the portal and the views related to the portal can provide alternative perspectives to instructional designers in terms of designing flexible online educational approaches during unprecedented circumstances like the Covid-19 pandemic. Besides, the results of this study have importance to ensure inclusive and equitable quality of education for all students. Therefore, the Ministry can organize effective ways in preparing teachers, students and parents to use online learning environments. Therefore, this

research aimed to understand middle school students', their parents' and mathematics teachers' experiences and views of learning and teaching at home by utilizing the EBA portal during the pandemic of 2020. The following research questions guide this study:

1. What features of the EBA content portal do students and teachers use and find useful for learning and teaching mathematics during the Covid-19 pandemic?

2. What are the expectations of students, teachers and parents for learning and teaching activities of mathematics during the Covid-19 pandemic?

3. What are the preferences of students, teachers and parents for synchronous math lessons at home or face-to-face classes at schools?

Online education implementations in Turkey during the pandemic

The MoNE in Turkey initiated the Project for Increasing Opportunities and Improving Technology (FATİH) for the more productive use and across-the-board dissemination of information and communication technologies (ICT) in educational arena in 2011. Moreover, the MoNE created an e-content portal called the Education Information Network (EBA) for both students and teachers at every grade level (MEB, 2021a). This platform included effective materials that can be used in any settings (Fiş-Erümit, 2020). EBA content portal includes content such as audio, video, animations, games, interactive applications, e-books and e-tests. For example, more than 5,000 books are presented to teachers and students with more than 240,000 questions in the portal (MEB, 2021a). Through the EBA, teachers and students can interact with each other. In this regard, each student and teacher can share messages from their wall areas, discuss and message (MEB, 2021a). Thus, students who need information can access via the portal wherever they want, which helps the students who do not attend formal education due to illness, natural disaster, or personal reasons to meet the educational needs outside of school (Tüysüz & Çümen, 2016).

Two weeks after the closure of schools, the government released three new television channels for distance education at primary, middle, and high school levels respectively, which are EBA İlkokul, EBA Ortaokul, and EBA Lise. Access to EBA channels is possible on TV and the Internet through the portal. EBA TV channels support students' learning. However, the students think that the televised resources were not adequate to prepare them for nationwide exams during the Covid-19 pandemic. Thus, on 27 April 2020, MoNE planned to conduct synchronous lessons through the portal for all students for each grade level five days a week. The Ministry determined the times of synchronous lessons, but school principals activated the sessions. To enter synchronous lessons, students and teachers get an EBA user account. Teachers can use the Whiteboard application in the synchronous lesson where teachers can turn on/off students' microphones and cameras, manage students' screen sharing and drawing permissions (Fiş-Erümit, 2020). After the lessons, teachers could assign homework to their students (e.g., lecture videos, questions problems) via the portal. A total of 7,383,213 students and 1,030,516 teachers regularly utilized the portal in the period of distance education (MEB, 2021b). Moreover, 5,954,174 synchronous lessons were conducted in the portal from March to July (MEB, 2021c). It is not predictable when schools will reopen due to the pandemic. Learning general thoughts about distance education may be useful in eliminating the problems and improving the system further based on the perspectives of teachers, students and parents.

Methodology

In this study, we employed a qualitative explanatory case study to obtain students', parents' and teachers' experiences with Turkey's online education model during the Covid-19 pandemic. Through this qualitative approach, we seek to scrutinize and articulate a contemporary phenomenon carefully (Yin, 2014) to identify prevalent themes and their interconnections (Creswell, 2007).

Participants

As the participants of the study, 51 7th grade students (22 female, 29 male),53 people who were the parents of these students, and 7 middle school mathematics teachers at a state school in Turkey. All participants voluntarily participated in the study at the end of the first semester of the 2020-2021 academic year. We used convenience sampling because access to students and families was difficult due to the closure of schools during the pandemic. In convenience sampling, the researcher selects an easily accessed sample (Patton, 2002). In this study, because one of the researchers was a teacher at the school, we could access volunteer students, parents and teachers easily. Thus, we gained information about learning and teaching mathematics via the portal during the pandemic in terms of students, families and parents. Table 1 shows the demographic information of the teachers who participated in the study. According to Table 1, teachers' education levels were mostly undergraduate and their teaching experience varied from 6 to 28 years in middle school settings (5-8 grade).

Table 1. Demographic Information of Mathematics Teachers

Teachers	Gender	Education level	Teaching experience (year)
T1	Female	Undergraduate	28
T2	Male	Undergraduate	26
T3	Female	Undergraduate	17
T4	Female	Undergraduate	19
T5	Female	Master degree	14
T6	Male	Undergraduate	13
T7	Female	Master degree	6

We presented demographic information of the parents in Table 2. As a parent, either each student's mother or father participated in the study. According to Table 2, the majority of the parents consisted of females. The majority of the parents had elementary or secondary education. Moreover, most of the parents who participated in the study were female and homemakers.

Table 2. Demographic Information of the Parents

	Gender			Education level			
	Female	Male		Elementary	Secondary	Undergraduate	Master
Freq. (%)	46 (87)	7 (13)		25 (47)	20 (38)	6 (11)	2 (4)

Data collection

We developed three questionnaires through Google Forms (a teacher form, a parent form, a student form) to gather data (see Appendix). We developed the questionnaires separately for each participant group. An expert at mathematics education reviewed the questions in the

questionnaires in terms of the suitability of the questions. We carefully prepared the questionnaires to obtain in-depth information regarding the participants' experiences and views on the portal during the process. We prepared all questions considering the teacher researcher's experiences and relevant literature (e.g., Fiş-Erümüt, 2020; Yates et al., 2020). We piloted the questionnaires with three non-participant teachers, students, and parents. All questions excluding gender and education level were open-ended in the questionnaires.

We asked basic information (e.g., gender, age, education level, teaching experience) in the first section of the teacher questionnaire. Similarly, the first section of the parent form also included some basic variables (e.g., gender, occupation, education level). The second section of all questionnaires consisted of the following components: (1) assessment of the features of EBA content portal in terms of learning and teaching mathematics, (2) expectations and suggestions related to the educational implementations during the pandemic, and (3) preferences for different learning (face-to-face, synchronous or both) and factors affecting their preferences and choices. We sent the online link for the questionnaire forms separately to teachers, students and parents via the mobile application "WhatsApp" to facilitate the data collection process mutually and to provide the participants with the opportunity to respond comfortably. Thus, the participants were able to see only the related questions, not the all questionnaires. Participants responded to the questionnaire in a week at the end of December 2020. We emphasized that their opinions were crucial in both the questionnaires and synchronous lessons. We also did not ask their names from the participants in the questionnaires to prevent biased opinions.

Data analysis

We utilized content analysis to identify codes and themes in data. We created three separate Excel documents in which we wrote participants' responses for each question. After all, the responses were moved to Excel, we read the responses and coded separately to determine the relevant parts of the data. We grouped these emergent codes according to research questions and participant types. Next, we established sub-themes by categorizing the codes under each theme depending on differences and similarities. Finally, we selected the themes to identify the connections among codes. In the coding process, each researcher produced the codes, sub-themes, and themes that emerged from the data independently. The researchers discussed the themes and codes to reach a consensus. The level of agreement among researchers in coding was found .89 according to Miles and Huberman's (1994) formula. We also performed some basic quantitative analysis. Although the questionnaires included open-ended questions, we found it useful to emphasize the percentages of responses related to a code. To ensure validity and reliability, we used direct quotes from the participants. Moreover, we provided detailed description obout methodology and all procedures in the study. Moreover, one researcher was the teacher at the school from which we collected data. It provided a significant perspective on the data collection/analysis, and interpreting the findings. We also used pseudonyms for the participants (e.g., for teachers, T1-…-T7; for students, S1-…-S51; and for parents, P1-…-P53).

Findings

Use of the EBA content portal during the online education

Table 3 shows the features that students frequently use in the EBA content portal for mathematics lessons in the online education. According to Table 3, 41% of the students found it useful to solve the exercise or test questions in the EBA for the mathematics lessons. Also, students stated that they frequently used math videos, animations, or game contents on the portal. For example, a student explained, "there are videos… So, I repeat the subject we have covered" (S36). Moreover, 21% of the students stated that they also used EBA to review math lessons (e.g., "…lectures, tests, and exercises are very useful for repeating the lesson and reinforcing the subject". (S44)). Only two students wrote that they specifically used EBA for homework (e.g., "…I use it for assignments from the portal" (P33)). Besides, 29% of the students wrote that they did not use the portal in any way except synchronous lessons.

Table 3. Students' Use the EBA Content Portal

Students' use of EBA*		Frequency (%)
Using EBA in addition to synchronous lessons	Solving problems (doing exercises)	21 (41)
	Videos/animation/game	14 (27)
	Reviews of math lessons/narratives	11 (21)
	Doing assignments/homework	2 (3)
Not using the EBA except the synchronous lesson	Not utilizing the EBA	15 (29)

*Percentages were calculated out of n=51.

Table 4 presents teachers' use of the features of the portal during the Covid-19 pandemic. We also asked the teachers what features of the portal they used before the pandemic and what features of the portal they plan to use after the Covid-19 pandemic. Before the pandemic, five of the teachers stated that they sometimes used the portal and two teachers did not use any features of the portal. According to Table 4, teachers who used the portal before the pandemic mostly benefited from the narratives, especially in terms of visual content. For example, T4 explained: "Before the pandemic, I use the EBA in topics that require visual expression, especially in geometry. It is useful". Besides, the teachers used the portal for the synchronous lessons indispensably during the Covid-19 pandemic. Moreover, teachers' written explanations showed that they frequently use the portal for reviewing math lessons, assigning homework, and different mathematical problems and exercises. T2 wrote, "I use the EBA for assigning homework during the Covid-19 pandemic. Thus, they can easily see what they will do". Similarly, T4 stated that during the pandemic, I asked the students to solve problems and exercises in the portal, those problems have different mathematical characteristics in each topic".

Table 4 also shows that six teachers expressed they will continue to use the portal after the pandemic for their mathematics lessons. T6 stated that he would not use the portal after the pandemic. However, even if teachers think to use the features of the EBA after the pandemic, the number of teachers who would use the features of the portal decreased. Teachers generally tended to use problems/exercises in the portal after the pandemic. For example, T7 wrote,

"after the pandemic, I am thinking of solving the test questions or exercises in the EBA with the students in the classroom". Finally, the findings revealed that the features used by students and teachers for the mathematics lessons in the portal are parallel.

Table 4. Teachers' Use of the EBA Content Portal

Types of uses	Before pandemic	During pandemic	After pandemic
Synchronous lessons	-	T1,T2,T3,T4,T5,T6, T7	-
Reviewing math lessons/narratives	T1,T2,T3,T4,T5	T2,T3,T4,T7	T2,T4
Assigning homework	T5	T2,T5,T6,T7	T2,T5
Using problems/exercises	T3	T1,T3,T4,T5,T7	T1,T3,T7

Views about useful features of EBA content portal for learning and teaching mathematics during the pandemic

Table 5 indicates that 70% of the students found the contents (e.g., videos, narratives, exercises, games etc.,) on the portal sufficient. However, eight students stated that the portal should be improved in terms of the contents and variety of mathematical problems and videos. Moreover, seven students found it inadequate, but they provided no reason. For example, S36 wrote, "I think it's insufficient." and S28 said, "It has not different feature" in the form.

Table 5. Students' Opinions on the Sufficiency of the EBA Content Portal

Sufficiency of EBA content portal	Sufficient	Improvable	Not sufficient
Frequency (%)	36 (70)	8 (16)	7 (14)

All frequencies were calculated out of n=51.

According to Table 6, students mostly focused on the math-related features of the EBA content portal. For example, 21% of the students found repeatability of mathematical topics is the most useful feature of the EBA for distance mathematics education. In this sense, S20 wrote, "…we can review math topics on the EBA, which allows me to examine the topics what I don't understand again". Similarly, S38 expressed, "the presence of lectures in the EBA is useful". 20% of the students found the EBA portal entertaining. Regarding this, S37 said, "the portal is entertaining because it includes different videos and games related to mathematics." Besides, 18% of the students focused on the mathematical problems, tests and exercises as the useful feature of the portal. For example, S24 wrote, "the existence of tests, exercises, games and lectures is useful. I generally solve these questions on the EBA". Differently, seven students found the portal useful in terms of easy access to mathematics lessons. For example, S12 expressed, "we do not stay away from the lessons during the pandemic process and do not forget what we have learned". In Table 4, a few students' written explanations included active participation in the lessons and screen sharing are the best features of the portal. For example, S21 stated his opinion in the form as "screen sharing is useful. We can see a different kind of math resources on the screen".

Table 6. Students' Opinions about Useful Features of EBA Portal for Math Lessons

Students' opinions	Frequency (%)

Math-related features	Repeatability	12 (24)
	Entertainment	10 (20)
	Solving problems/doing exercises	9 (18)
Other features	Easy access	7 (14)
	Screen sharing	2 (4)
	Active participation	2 (4)

According to Table 7, the views of the teachers about the most useful features of the portal had similarities with the features they used in the EBA. Thus, they tended to use the features of the platform that they found best. The teachers wrote that reviewing math lessons/narratives and problems/exercises are the best features of the platform. For example, T4 stated his opinion "Reviewing math lessons and exercises are useful because my students like them". Teachers' views have similarities with the statements of the students. Moreover, two teachers emphasized the synchronous lessons in the EBA content portal. In this sense, T7 said, "I think synchronous lessons is very useful to access our students in such a process".

Table 7. Teachers' Opinions about Useful Features of EBA Portal for Math Lessons

Types of EBA uses	Teachers
Reviewing math lessons/narratives	T1,T2,T4,T5,T6
Using problems/exercises	T1,T2,T3,T4,T6
Synchronous lessons	T6, T7
Assigning homework	T6

Expectations of students, parents and teachers for learning and teaching mathematics during the pandemic

Students' expectations. According to Table 8, almost half of the students wrote they did not expect anything from their parents during the Covid-19 pandemic in terms of learning and teaching mathematics. For example, S12 wrote, "my family tries to provide all opportunities for my education." However, 29% of the students explained that they need environmental/technological support from their parents. For example, S8 wrote, "my phone is not very good, it is contracting. I wish my family takes a tablet or computer". Some students expected their families to prepare a suitable study environment during synchronous lessons. S25 expressed, "my family should provide me with a quiet environment".

Some students also needed help from family support to solve problems in internet access. For instance, S34 stated that my mom could help me if synchronous lessons suddenly close. Besides, 22% of the students have expectations related to mathematics learning support from their parents. Regarding this, S18, "I need some private math lessons. To this, my family can help me". Another student, S27, said, "Some math questions can be difficult. When I have difficulty my parents can help with some questions". Similarly, some students need support from their parents to repeat the mathematical subjects they did not understand in the synchronous lessons.

Table 8. Students' Expectations

Students' expectations	Frequency (%)
Expectations from parents	

No expectation	25 (49)
Environmental/technological support	15 (29)
Mathematics learning support	11 (22)
Expectations from teachers	
No expectation	24 (47)
Increasing the quality/variety of math resources	10 (20)
Increasing the number/duration of math lessons	9 (18)
Increasing the quality of math instruction	8 (16)
Expectations from the EBA portal	
No expectation	17 (33)
Eliminating technical problems in the portal	19 (37)
Increasing the quantity/variety of math resources	9 (18)
Increasing the number/duration of math lessons	6 (12)
Access to the portal without Internet	5 (10)

According to Table 8, 47% of the students find the teacher sufficient for distance mathematics education and do not expect anything. However, some students expected to increase the variety or quality of the resources used in synchronous mathematics lessons. In this sense, S38 wrote, "I think it would be more fun if our teacher provides game-based activities. Thus, most people show more interest in math lessons". Similarly, S24 stated that I think my teacher is effective, but we can solve more math problems in the lessons, outside of our mandatory math textbook. One another example can be S25's written explanations: "The teacher can use different interesting mathematics resources". Alternatively, 18% of the students expressed their expectations from their teachers about the number or duration of synchronous lessons. For example, S29 emphasized the duration of the lessons as follows: "the duration of the lesson seems too short to me. If the duration of the lessons is increased, the teacher can tell better and longer". Likewise, S18 wrote, "our teacher can make additional math courses because the number of math lessons is not enough to cover the topics". Besides, eight students expressed their expectations from the teacher about teaching mathematics to be more understandable and detailed. For example, S23 said, "my teacher can provide more clear explanations. Sometimes, I could not understand how she solved a problem". One student, S33, said to the teacher's expectation about virtual classroom management like that "Sometimes noise is coming from the background. Some students make noise in math lessons. My teacher should eliminate it".

Table 8 also shows that 33% of the students did not have any expectations about the platform. However, 37% of the students explained their technical problems with the platform. They expect the platform to eliminate those problems. For instance, S23 wrote, "we are entering the system, but the system sometimes drops out me from the lesson". Another student (S25) said, "We are entering the system late, the portal can fix this problem. We need rapid access to synchronous math lessons". Besides, nine students (18%) suggested that the quantity and variety of math resources in the portal can be increased by the authorities. For example, S21 wrote, "the portal should provide math-related games". According to S34, "the videos of mathematics narratives should be increased". Besides, according to six students, expects changes in terms of the duration/number of synchronous math lessons on the portal. Students especially did not want synchronous lessons in the early morning hours. For example, S31

wrote, “the lessons are too early. They can start at 13.00 instead of 8.30”. Five students expect to be able to attend the portal and synchronous lessons without the Internet.

Parents’ expectations. Table 9 explains parents' expectations from teachers and the portal. When compared with Table 8, it was seen that parents had similar expectations with their children. According to Table 9, 55% of the parents did not have any expectations from the teacher. Besides, 23% of the parents think that the quality of mathematics education should be increased. Five parents suggested that teachers must improve mathematical expressions in the virtual lessons and seven parents suggested strengthening the classroom interaction.

> “The teacher can ask questions on a related topic to each student. Interaction between students and teacher is crucial to learn mathematics, but the time might be a problem" (P11).
> “Teacher must communicate with the children one to one to understand whether students understand mathematics subject and help them because math is a difficult course...” (P16).
> "Teacher can teach the math topic by using more detailed and interesting approaches" (P38).

17% of the parents expressed their expectations from the teacher for increasing the variety or quality of the resources used in mathematics lessons. Parents especially think that teachers should solve more mathematics questions in the lessons. Finally, some parents wrote that the number of math lessons should be increased and the timing of synchronous lessons can be changed.

> “The teacher can make exam at the end of each math topic. Further, they can regularly solve mathematical problems with the students in each week" (P3).
> “Online math exams can be held every day. Thus, the exams motivate students to study on math topics. When we ask our children to study mathematics, they do not listen to us" (P5).

Table 9. Parents’ Expectations

Parents expectations	Frequency (%)
Expectations from teachers	
No expectation	29 (55)
Increasing the quality of math instruction	12 (23)
Increasing the quality/variety of math resources	9 (17)
Changing the number/duration/timing of math lessons	4 (8)
Expectations from the EBA portal	
No expectation	29 (55)
Eliminating technical problems in the portal	11 (21)
Increasing the quantity/variety of math resources	6 (11)
Increasing the number/duration of math lessons	6 (11)
Access to the portal without Internet	5 (9)

All percentages were calculated out of n=53.

According to Table 9, 55% of the parents did not have any expectations from the portal. However, similar to the students, 21% of the parents think that the authorities should fix

technical problems in the portal. In this sense, the parents expressed that "the systems drop out students. The EBA can solve this problem". Similarly, P40 said, "the authorities should study on the portal more to eliminate technical problems". Differently, 11% of the parents also focused on the mathematical characteristics of the portal. They suggested that the portal can be enriched in terms of more visual and math activities. Apart from this, six parents suggested that the duration or number of synchronous math lessons should be increased by the system. (e.g."… I think the duration of the lessons is not enough, maybe it can be prepared in a way that encourages children to study" (P11)). Finally, five parents explained that they need to access to the portal without the Internet. For example, P35 wrote, "Internet is not enough for children, synchronous lessons consume 5-6 GB per day".

Teachers' expectations. Table 10 presents teachers' expectations during the Covid-19 period. According to Table 10, teachers' expectations from students included doing assignments, regular participation in the virtual lessons, and motivation to learn mathematics. Some written statements were presented below:

> "I expect regular participation timely and complete their homework, and provide feedback to understand whether my students understand math topics" (T4).
> "First of all, I expect them to attend the class regularly. As you know, the concepts in mathematics depend on lower-level mathematical concepts. When they do not participate in the lesson, there could not make connections between the concepts. I also expect that students should strive for an understanding of mathematical concepts. Furthermore, they should do their homework and solve lots of problems and exercises" (T7).

Those statements indicated that teachers mainly expect that students should take their learning responsibility during distance education. The findings show that teachers focused on students' participation. When the students were asked a question about the participation in synchronous math lessons in the portal, 67% of the students wrote that they regularly participated. 22% and 12% of the students stated that they did partial participation and no participation respectively. Students provided some reasons why they did not participate in the lessons regularly (e.g. limited internet access, technical problems of the portal, early time of lessons, personal reasons (e.g., traveling, home repair), lack of knowledge on the portal, and lack of concentration and understanding of math lessons).

Table 10. Teachers' Expectations

Teachers' expectations	Teachers
Expectations from students	
Doing assignments	T2,T3,T4,T5,T6,T7
Regular participation	T4,T5,T6,T7
Motivation	T1, T2
Expectations from parents	
Following students' participation	T1,T2,T3,T4,T5,T6,T7
Support for students' assignments/math content	T2,T4,T6,T7
Expectations from the EBA portal	
Increasing the quantity/variety of math resources	T2,T4,T5,T7
Eliminating system errors in the portal	T1,T3,T5,T7

Increasing the number/duration of math lessons	T6, T7

All teachers expect parents to ensure that their children attend synchronous math lessons regularly (see Table 10). Moreover, four teachers asked parents to support their children in performing the given mathematical tasks or learning mathematics.

> "I expect them to help their children and guide them to stay in the synchronous math lessons. They show their seriousness towards the school here, too" (T5).
> "Parents support their children in terms of regular participation in the lessons. I would prefer that they inform children more about the seriousness and necessity of the participation" (T7).

Table 10 indicated that teachers' expectations from the portal were similar to students' and parents' expectations. Four teachers stated that the number or quality of content on the portal should be increased (e.g. "Drawing of shapes are difficult. PDF documents of some topics are missing" (T2)). On the other hand, four teachers wanted systemic errors to be eliminated. For example, T5 wrote, "The majority of complaints from EBA originates from the system." Also, two teachers suggested increasing the duration of the synchronous lessons.

> "The hours at which courses can be assigned in the system can be troublesome such as being too early or too late. The duration of the lesson is also 10 minutes less than face-to-face education, but it is a very valuable time for mathematics that sometimes includes multiple-step operations" (T7).

Preferences for synchronous math lessons or face-to-face classes

According to Table 11, 92% of the students, 81% of the parents and all of the teachers preferred face-to-face mathematics lessons instead of synchronous lessons on the portal. Only two parents approved of both forms of education.

Table 11. Participants' Preferences for Mathematics Lessons

	Frequency (%)		
Preferences of math lessons	Students	Parents	Teachers
Face-to-face math lessons	47 (92)	43 (81)	7 (100)
Synchronous math lessons	4 (8)	8 (15)	0
Both	0	2 (4)	0
Total (%)	51 (100)	53 (100)	7 (100)

Table 12 explains the reasons why students, teachers and parents prefer face-to-face or distance education. The participants preferred face-to-face lessons since they found it is more understandable than distance education. For example,

> "I prefer face to face [lessons]. Because we understand better in face-to-face lessons. Besides, it is a great problem not to be able to attend only a synchronous lesson, but we have time to reinforce what we do not understand in face-to-face education" (S20).
> "Face to face lessons. Because I do not think that children understand the mathematics lesson in distance education. For example, my child is behind in math lessons and I always support him at home. I am very depressed about this" (P16).

Most students and two parents preferred face-to-face education because of the lack of systematic or internet problems. Some written statements are below.

> "[I preferred] face-to-face lessons because there are no connection problems in face-to-face lessons" (P17).
> "Internet problems can occur in distance education. Sometimes we could not hear teacher's voice, sometimes the system drops out me. There are no such problems in face-to-face education" (S24).

One reason that students, parents and teachers agree is that face-to-face education is more efficient in terms of learning and teaching mathematics. For example,

> "I prefer face-to-face lessons. I do not get enough feedback on how much students listen or understand the lesson. Also, I do not find it efficient for students to look at a screen for a long time and listen to a lecture" (T4).
> "Face to face because children can be more relaxing at home and they do not listen to the lesson efficiently" (P14).

Table 12. Reasons for Preferences of Forms of Mathematics Lessons

Preference	Reasons	Frequency of reasons			
		Students	Parents	Teachers	Total freq.
Face-to-face math lessons	comprehensible	11	9	1	21
	no technical/internet problems	15	2	0	17
	productive	5	11	2	18
	easy communication	8	2	4	14
	better concentration	3	7	1	10
	entertaining	3	0	0	3
	longed-for school	3	0	0	3
	social interaction	0	1	0	1
	regular participation	0	1	0	1
Synchronous math lessons	healthy in pandemic	1	8	0	9
	understandable	2	0	0	2

Students and teachers mostly preferred because they found face-to-face lessons easier to make the effective communication.

> "In face-to-face lessons, we establish a strong and easy interaction with students. This interaction allows us to communicate more easily" (T5).
> "I would prefer face-to-face lessons because we express our ideas more easily in face-to-face lessons" (S15).

Different from parents and teachers, students wrote that they found the school environment more enjoyable and expressed their longing for school. For these reasons, they preferred face-to-face lessons. Finally, according to Table 12, a few students preferred distance education because they found either it is healthy or they found it more understandable than face-to-face education. On the other hand, eight parents who preferred distance education stated that they

do not want to endanger their children's health due to the pandemic. For example, P13 said, "I prefer distance education in this period. Because the health of our children is more important during the pandemic period".

Discussion

In this study, we aimed to understand the learning and teaching mathematics in middle schools in Turkey during the Covid-19 pandemic from the perspective of students, teachers and parents. We gained valuable information about the strength and drawbacks of the process. These results can be utilized to design and develop effective practices.

The results showed that the students and teachers provided mostly positive opinions about the features of the EBA portal and synchronous mathematics lessons conducted on the EBA. The features they used in the portal and the feature they found effective had similarities. The results showed that they found useful the EBA portal in terms of easy access to the math-related content in different and attractive modes (e.g., video, animation, game, problems, exercises, narratives etc.) (Fiş-Erümit, 2020). The quality and quantity of learning and teaching resources and materials is a crucial factor affecting online/distance education (Chao et al., 2006). Researchers point that the effectiveness of online/distance education is closely related to the support of appropriate curriculum resources provided in the process (Al-Samarraie et al., 2017; Hebebci et al., 2020). In this sense, the portal has provided mathematics teachers and students with a variety of quality and type of learning and teaching resources in Turkey. Moreover, teachers submitted homework assignments through the portal and gave opportunities students to utilize the portal routinely. These results supported that online learning environments are widely used as an innovative tool to support educational activities (Kong et al., 2014; Staker & Horn, 2014). Interestingly and unexpectedly, online education platforms have become as a necessity under these hard and compulsory conditions in the world.

In this study, the expectations of teachers, parents and students from each other and the portal in online education were similar. For example, students and parents mainly expected the teachers to increase the quality/variety of math-related resources to enhance the math topics learned in synchronous lessons. This concern is important for the students and their families since middle school students enter a nationwide examination at the eighth grade level in Turkey (Fiş-Erümit, 2020). Even though students benefited from the problems/exercises and tests in the EBA portal, they need to reach more resources and problem solving activities to prepare those exams. Besides, some students and parents argued that teachers' instructional techniques were not sufficient to explain mathematical concepts. Thus, they expected teachers enrich a variety of different modes and quality resources and presentation techniques rather than using mere narration. These results highlight the necessity of developing effective instructional methods especially in the online environment (Fiş-Erümit, 2020, Mailizar et al., 2020).

Upon the outbreak of the Covid-19 pandemic, children can watch lessons on television via EBA TV channels in Turkey. Thus, each student watches the same lesson easily without access to the Internet, but the lessons on EBA TV are based on one-way communication and lack interaction. As a result, synchronous lessons have started in September 2020 in Turkey.

All participants found synchronous lessons more effective than the lessons on EBA TV channels. However, synchronous lessons require access to the Internet on the portal, technological devices (e.g. computer, laptop, IPad or telephone), digital literacy and an appropriate physical environment (Bokayev Bokayev, Torebekova, Davletbayeva, & Zhakypova, 2021; Parmigiani et al., 2020). This situation affects some students' participation in the lessons at home. The results indicated that some students faced limited availability of technological devices and a lack of fast Internet connectivity. As a result, they need technological and environmental support. MoNE delivers free tablets with a 25 GB monthly internet package according to the income status of the families and the number of siblings at school age.

Similar to other studies (Fiş-Erümit, 2020; Hebebci et al., 2020), students complained about timing and short duration of lessons, although the synchronous lessons were scheduled at the same hour as face-to-face classes. In Turkey, one synchronous lesson takes 30 minutes. Normally, one lesson takes 40 minutes in face-to-face classes. By indicating the abstract nature of mathematical concepts and the necessity of problem solving in mathematics, the students, parents and teachers suggested that the duration of synchronous lessons should be increased.

Many studies confirm the significant role of parents in the education and development of their children (Bokayev et al., 2021; Đurišić, & Bunijevac, 2017). In this regard, parents' involvement in online education is crucial to support students' academic achievement (Berthelsen & Walker, 2008). According to Curtis (2013), parents have three responsibilities in online education: to motivate, monitor and mentor their children. Similarly, the results showed that teachers expected these responsibilities from the parents in the online education. However, the level of parental support depends on many factors such as parents' technological knowledge, education level, socio-economic characteristics, and marital status (Jónsdóttir et al., 2017). In our study, students mostly stated that they did not need the help of their parents due to the easy-to-use interface of the portal. Bokayev et al (2021) found that "the level of parents' satisfaction with the quality of education during the Covid-19 pandemic directly correlates with their evaluations of the level of competence of teachers and the readiness of the government to implement distance/online learning" (p.10). In our study, more than half of the parents satisfied teachers' online education implementations in Turkey, which can be related to the timing of the data collection process. In related literature, some teachers in different countries expressed their thoughts on limited time to learn new technology and use it (Khlaif et al., 2020).We collected the data in December 2020, when teachers gained experience in distance education and the government has implemented many practices to make distance education effective. For example, early time of the pandemic, researchers found that teachers' use of technology is not sufficient (Fiş-Erümit, 2020; Parmigiani et al., 2020). However, in our study, the students and parents did not complain about mathematics teachers' use of technology. This result may be related to various factors. According to Clark-Wilson et al. (2020), teachers in Turkey were more prepared to teach mathematics online than the teachers were in other countries (e.g., USA, Germany). Moreover, mathematics teachers are accustomed to using technological applications in Turkey due to the portal and FATİH project launched by the MoNE in 2011 (MEB, 2021a). Another factor can be the data collection period because the teachers have gained experience with online education during the pandemic. Due to these reasons, teachers have used current technologies and combined them with their subject knowledge (König et al., 2020).

The pandemic did not become a barrier for students in Turkey to sustain education although they are not able to go to school. Nevertheless, the majority of the participants preferred face-to-face math lessons at schools to online learning at home. Various studies have presented the familiarity of the learning environment, teacher-student interaction, being with friends, and longed for the school as the reasons for the preference for face-to-face lessons (Fiş-Erümit, 2020; Reimers & Schleicher, 2020; Yates et al., 2020). Moreover, high-level interaction and communication are not easy in distance education (Hebebci et al., 2020). In this sense, students and especially teachers generally preferred face-to-face math lessons by criticizing the difficulty of interaction in a virtual learning environment.

This study has some limitations. First, we focused on students, their parents and mathematics teachers in a middle school in Turkey, which makes it difficult for generalization. However, we did not aim to generalize the findings in this qualitative study. The Covid-19 pandemic has affected not only students or teachers but also parents. For this reason, we think that the results of our study make a novel and interesting contribution to understand the effects of the pandemic on learning and teaching mathematics from different viewpoints. Second, we collected the data through Google Forms. Someone might consider it as surface-level data. However, we used open-ended questions to get detailed data and did not ask the participants for their names.

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Appendix

Teacher Questionnaire

Gender: Female Male
Education level: Graduate Undergraduate Doctorate
Teaching experience (Year):
By which application(s) do you teach your synchronous lessons on the EBA?
Zoom Skype Google meet Other .....
How was your frequency of using EBA before the pandemic period? And what did you usually use it for?
Never Rarely Sometimes Often Always
Your purpose of use: .....
Which features of the EBA do you use in addition to synchronous lessons? If so, could you explain for what purposes and how you used these features?
What is the most useful feature or features of the EBA?
What do you think about the participation of students in distance mathematics education on the EBA? Why do you think those who do not participate?
What are your expectations from students to increase the effectiveness of your distance mathematics lesson on the EBA?
What are your expectations from parents to increase the effectiveness of your distance math lessons on the EBA?
What problems do you experience while using EBA in your distance math lessons?
What are your suggestions for making EBA more effective for your mathematics lesson?
When the distance education process is over, will you continue to use EBA in your course for any purpose after the pandemic? If your answer is yes, what will you prefer to use it for?
Do you prefer distance math lessons or face-to-face math lessons? Why?

Student questionnaire

Gender: Girl Boy
Grade Level: 5 6 7 8
Parent Job Status: The only mother works. The only dad is working. Both are working.
Are there any features of EBA you use for math lessons other than synchronous lessons? If yes, what are they? For what purposes and how do you use these features?
What is the most useful feature(s) of the EBA for mathematics lessons?
Can you regularly attend synchronous math lessons at the EBA?
Do you find the contents (video, lectures, exercises, games, etc.) in the EBA sufficient for your math lessons?
What are the problems you encounter with the EBA in math lessons during distance education?
What are your expectations from your parent to increase the effectiveness of your distance math lessons on the EBA?
What do you think the teacher can do to increase your distance math lessons on the EBA?
What are your suggestions for the EBA to be more effective?
Do you prefer distance mathematics education or face-to-face education? Why?

Parent questionnaire

Gender: Female Male
Education Level: Primary Secondary Undergraduate Postgraduate Doctorate
Job:
Have you received any support to learn the use of the EBA? If so, how did you get support?
Do you think your child regularly attends synchronous math lessons on the EBA? Why?
What are your thoughts on teaching synchronous math lessons on the EBA?
What do you think the teacher can do to increase your distance math lessons on the EBA?
What are your suggestions for the EBA to be more effective?
Do you prefer distance mathematics education or face-to-face education? Why?