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Secondary Students' Experiences with Distance Education for Mathematics Courses During the Covid-19: The Sample of Turkey

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Abstract

The aim of this study is to reveal the opinions of secondary school students about the mathematics lessons conducted during the Covid-19 pandemic process. This research is a descriptive study based on survey model. The sample group of the study consists of 740 secondary school students who have been attending public schools in the Black Sea Region of Turkey in the 2020-2021 academic year. A questionnaire consisting of three open-ended questions and five question items created by the researchers was used as data collection tool in the study. The questionnaire was created on the Google Forms platform and delivered to the students by this way. As a result of the study, it was stated that most of the students had difficulties in the mathematics lessons conducted during the pandemic, and these difficulties generally emerged in terms of not being able to understand the lesson or lack of digital resources. Students generally stated that they could not understand the teacher in online lessons, could not focus on the lesson, online lessons were not permanent and productive, and these lessons reduced their motivations towards the lesson. The data obtained from the study were discussed in relation to the literature and appropriate suggestions were made in line with the results of the study.

Keywords: Covid-19, Distance Education, Mathematics Lessons, Secondary Students, Student Experiences

1. Introduction

Covid-19 (New Type Coronavirus), which emerged in Wuhan, China in December 2019, spread all over the world in a short time and was declared a pandemic by the World Health Organization on March 11, 2020 (Anjorin, 2020; Jebri, 2020). Since the disease can be transmitted from person to person in many ways, especially respiratory and contact, and cause fatal results, infection and death rates have increased to alarming levels worldwide in the first quarter of 2020 (Johns Hopkins Coronavirus Resource Center, 2020). This situation has caused national governments to take some precautions such as social distance, quarantine practices, martial law, travel, and

education restrictions to control the spread of the epidemic (Bourouiba, 2020) and the dynamics of life all over the world have changed completely.

According to Telli and Altun (2020), education is the sector most affected by COVID-19 after the health sector. Because, due to the rapid spread of the epidemic, many countries around the world had to pause their education activities and develop different alternatives. Within the scope of the measures to be taken against the epidemic, it was also recommended that the schools be closed. Countries have suspended schools on different dates, considering their own conditions. Thus, many countries such as China, Italy, USA, England, and Georgia have switched to distance education by taking a break from face-to-face education to minimize the impact of the pandemic on education. While the number of countries that closed schools was six in March, this number increased to 195 a month later. According to UNESCO (2020) data, as of April, the education and training lives of 92% of the students in the world have been interrupted by the pandemic. In this process, primary, secondary, and high schools in Turkey were suspended for a week as of March 16, 2020, and as of March 23, 2020, distance education was started, and teaching activities were continued through TRT EBA TV channels and Educational Information Network (EBA). EBA is defined as an online social education platform (Education and Information Network, 2016) opened for use by the General Directorate of Innovation and Educational Technologies without any charge. To provide an effective education and training, the distance education process was carried out by adopting the use of digital technology in Turkey, as in most countries.

Distance education is a computer-based teaching method in which the interaction between students and education practitioners is provided from a specific center in cases where classroom education cannot be provided due to limitations in the general education and training process (Moore, Dickson-Deane, & Galyen, 2011). Distance education has many benefits such as providing sustainability in education (Akinbadewa & Sofowora, 2020; Seage & Türegün, 2020), providing lifelong learning (Alharthi, 2020; Lou, 2004), and reducing education costs (Al-Husban, 2020; Baggaley, 2008; Hall & Knox, 2009) as cited in Hebebcı, Bertiz and Alan (2020). However, moving away from face-to-face education to online education in a very short time due to the pandemic has caused many negative effects on students (Crawford, Butler-Henderson, Rudolph, & Glowatz, 2020). According to United Nations, 770 million educated people in the world have been adversely affected by the closure of schools and universities due to the pandemic (Zhong, 2020). Despite this, since it is not clear when the pandemic will end, all educational institutions around the world have tried to develop distance education materials (Kaur, 2020). There were two main problems in this process. The first of these is the limited data on the effectiveness of distance education (McPherson & Bacow, 2015), and the second is digital resources (Liguori & Winkler, 2020). Lack of access to fast, affordable, and reliable internet connections hindered the online learning process, especially for rural communities (Wains & Mahmood, 2008). Students accessing the Internet via smartphones could not benefit from online learning because a significant amount of online content could not be accessed via smartphones (Adnan & Anwar, 2020). However, the transition from traditional education to distance education in a very short time as a necessity in the shadow of the pandemic has caused different problems related to learning environments. Purwanto, Pramono, Asbari, Santoso, Wijayanti, Hyun, and Putri (2020) stated in their study that 80% of children wanted to go back to school during the pandemic, they were bored with online education and most of the students were not satisfied with distance education. While Fitriyani, Fauzi, and Sari (2020) state that the COVID-19 pandemic has caused a decrease in the learning quality of students, Chiu (2021) says that student difficulties experienced in this process are generally related to motivation, cognitive load, and anxiety level.

When it comes to mathematics education, it can be predicted that the difficulties experienced in learning environments will be more because the integration of digital technologies into mathematics education is a complex task that requires consideration of many elements such as pedagogy, content, and student knowledge (Attard & Holmes, 2020). However, it is important to identify the difficulties experienced by teachers and students who do not have much knowledge and experience in distance education, and to shed light on similar applications to be made in the future. In this context, in this study, it was tried to reveal the opinions of students about the mathematics lessons carried out during the pandemic. It is thought that the findings will help to obtain a general picture about the effectiveness of the mathematics courses conducted during the pandemic. The sub-problems of the study are as follows.

- ✓ Do students prefer to learn mathematics by distance or face to face education? What are the reasons for these preferences?
- ✓ Did the students have difficulty in understanding the mathematics lessons conducted during the distance education process? What are the causes of these difficulties?
- ✓ Has the distance education process had any effect on students' love/interest in mathematics?

2. Method

This research is a descriptive study based on survey model. According to Karasar (2005), survey models are research approaches that aim to describe a past or present situation as it exists. Within the scope of this study, this method was preferred because it was tried to determine the opinions of the students about the mathematics lessons carried out during the pandemic process.

2.1 The Sample Group

The sample group of the study consists of 740 secondary school students attending public schools in the Black Sea Region of Turkey in the 2020-2021 academic year. In determining the sample group, convenient and criterion sampling methods were used together. The mentioned criteria are determined as attending public secondary schools and volunteering to participate in the study. Of the participating students, 239 (32%) were 5th grade, 190 (25%) were 6th grade, 159 (21%) were 7th grade, and 148 (20%) were 8th grade students. Of all students, 387 (52%) are female students and 353 (47%) are male students.

2.2 Data Collection and Analysis Process

A questionnaire consisting of 3 open-ended questions and 5 question items, created by the researchers, was used as a data collection tool in the study. The questionnaire was created on the Google Forms platform and delivered to the students in this way. Due to the pandemic, study data were collected online. The answers given by the students to the survey questions were handled with the content analysis method and coded under the common themes and categories determined by the researchers. In this process, inductive coding was done, and the answers that did not fall into the categories created by the researchers were coded under the other category. Responses that do not qualify as an answer to the questions asked or that contain expressions such as "I have no idea, I don't know, I'm not sure" were not included in the coding process. During the data analysis, the encoder reliability calculation was made for each survey question by consulting the opinions of another academician who expert in the field, and the relevant values were calculated above 0.80.

3. Results

In this part of the study, the findings will be presented in parallel with the sub-problems.

3.1 Do Students Prefer Mathematics Lesson with Distance or Face to Face Education? What are the Reasons for These Preferences?

In the first question of the questionnaire applied to the students within the scope of the study, 621 students (84%) answered that they would prefer to learn mathematics face-to-face, and 119 students (16%) answered that they would prefer to learn mathematics through distance education.

When the answers of the students who gave the answer, I prefer to learn the mathematics lesson face to face were analyzed, it was seen that these students put forward different reasons related to *Understanding the Lesson*, *Learning Environment* and *Physical Environment*. Responses that did not fall into these categories were coded under the *Other* category.

3.1.1 Reasons for Understanding the Lesson

The reasons given by the students who prefer face-to-face education in the category of *Understanding the Lesson* are as in Table 1.

Table 1: Reasons of students who prefer face-to-face education about understanding the lesson

| Reasons | Frequency (f) |
|---|---------------|
| I understand better/easier with face-to-face course. | 130 |
| I can't understand with distance education (with online course) | 77 |
| Face-to-face learning is more efficient/permanent for us. | 60 |
| Distance education is not efficient/permanent. | 10 |
| I can't focus on distance education. | 4 |
| TOTAL | 281 |

When Table 1 is examined, it is seen that students generally state that they do not understand the lesson in online environments and what they learn in these lessons is not permanent.

3.1.2 Reasons for the Learning Environment

The reasons given by the students who prefer face-to-face education in the *Learning Environment* category are divided into sub-categories as *Statements About Processing of the Lesson*, *Statements About Affective Factors* and *Statements About the Lesson Time*. All the justifications used regarding the Learning Environment are divided into sub-categories as for the Processing of The Lesson, for the Affective Factors and the Lesson Time. All statements in this category are listed in Table 2.

According to the data in Table 2, it is seen that the students put forward different reasons for *Processing of The Lesson* in face-to-face environments. Among the students' statements, the ones with a high frequency indicate that there is more student-teacher interaction in face-to-face environments, face-to-face education is more efficient, and they especially prefer the mathematics lesson to be taught with face-to-face education. Among the expressions containing *Affective Factors*, the ones with high frequency are that face-to-face lessons are more fun, and students are boring in online lessons. The statements about the *Lesson Time* category are that students can take longer lessons and solve enough questions in face-to-face education, but they do not find enough time to ask questions in distance education.

Table 2: Reasons of students who prefer face-to-face education about learning environment

| Reasons | Frequency (f) |
|--|---------------|
| <i>Expressions for the Processing of the Lesson</i> | |
| Interaction with the teacher is more in face-to-face education | 21 |
| In face-to-face education, I can ask my questions to the teacher face to face. | 21 |
| We learn more in face-to-face education. | 11 |
| Mathematics is difficult and it makes more sense to do it face-to-face. | 11 |
| It is difficult to calculate in distance education. | 4 |
| In distance education, the teacher cannot determine whether I understand or not. | 3 |
| We cannot do activities in distance education. | 3 |
| Geometry subjects require drawing, but the teacher cannot control them. | 3 |
| There is no school discipline in distance education. | 2 |
| I am lacking in subject in distance education. | 1 |
| Examples in distance education are insufficient. | 1 |
| In face-to-face education, everyone listens to the lesson. | 1 |
| Participation in face-to-face training is more. | 1 |
| It is more difficult for the teacher to teach remotely. | 1 |
| Writing in distance education takes a long time. | 1 |
| Total | 85 |
| <i>Expressions that include Affective Factors</i> | |

| | |
|---|------------|
| Face-to-face education is more fun. | 12 |
| I'm bored in online lesson. | 5 |
| I found excuses in distance education and started not taking notes and not listening to the lesson. | 2 |
| I would like to attend more classes in face-to-face education. | 1 |
| face-to-face training is more intimate. | 1 |
| Total | 21 |
| <i>Expressions About Lesson Time</i> | |
| We can teach face-to-face for longer periods of time. | 5 |
| There is no time to ask my questions in distance education | 2 |
| We can solve more questions in face-to-face training. | 1 |
| Total | 8 |
| GRAND TOTAL | 114 |

3.1.3 Reasons for the Physical Environment

The reasons put forward by the students who prefer face-to-face education regarding the *Physical Environment* are given in Table 3.

Table 3: Reasons of students who prefer face-to-face education about physical environment

| Reasons | Frequency (f) |
|--|----------------------|
| Technical problems (internet access, audio and screen sharing problems). | 77 |
| I concentrate better in face-to-face training. | 17 |
| My eyes get tired at the screen, we get distracted, we can't get fresh air. | 14 |
| I miss school, my teachers and my friends, there is very little socialization in distance education. | 9 |
| In distance education, we cannot do the things we do in school. | 1 |
| I'm bored at home in distance education | 1 |
| There is respiration in face-to-face education. | 1 |
| TOTAL | 120 |

According to the data in Table 3, it is seen that most of the students prefer face-to-face education due to technical problems. Other than that, expressions with high frequency are that I cannot concentrate in online education, I am boring, and I cannot socialize. The answers that could not be included in the categories here as the reason for preferring face-to-face education and were coded in the *Other* category are in Table 4.

Table 4: Other reasons for students who prefer face-to-face education

| Reasons | Frequency (f) |
|--|----------------------|
| Distance education is difficult / not good / there are too many problems. | 12 |
| Face-to-face training is better/helpful. | 6 |
| Opportunity for distance education (computer, internet, tablet, phone, etc.) is required. | 4 |
| It is more difficult in distance education to take the notes of the courses that we cannot attend. | 3 |
| TOTAL | 25 |

The answers in the other category are that *distance education is difficult, not good, and requires opportunities, etc.*

When the answers of 119 students who answered the first question in the data collection tool as *I prefer distance education* were examined, it was seen that 85 students (72%) gave reasons, and 34 students (28%) did not. When the answers of the students who gave reasons were examined, the statements used by the students were divided into categories as *Health-Related Reasons*, *Learning Environment-Related Reasons* and *Physical Environment-Related Reasons*. The answers for these categories are presented in Table 5.

Table 5: Reasons for students who prefer distance education

| Reasons | Frequency (f) |
|--|---------------|
| <i>Health-Related Expressions</i> | |
| I'm worried about corona | 42 |
| I think health is more important than education. | 12 |
| I have type 1 diabetes | 1 |
| Total | 54 |
| <i>Expressions about Physical Environment</i> | |
| Distance education/home environment is more comfortable. | 16 |
| There is a lot of noise at school. | 7 |
| Total | 23 |
| <i>Expressions about Learning Environment</i> | |
| I understand better with distance education. | 3 |
| It's easier to access the books. | 2 |
| It's easier to use the board. | 1 |
| I am more active in courses. | 1 |
| Total | 7 |
| GENERAL TOTAL | 85 |

When Table 5 is examined, it is seen that most of the students prefer distance education due to health reasons and then because they are more comfortable at home.

3.2 Did the Students Have Difficulty in Understanding the Mathematics Lessons Conducted During the Distance Education Process? What Are the Causes of These Difficulties?

To the second question applied to the students within the scope of the study, 466 students (63%) answered *Yes*, and 274 students (37%) answered *No*. The students who answered yes, put forward different reasons for the difficulties they experienced. Within the scope of the study, the reasons put forward by the students for this question were gathered under different categories as *Expressions About Physical Environment*, *Expressions About Understanding the Lesson*, *Expressions About Learning Environment*, *Expressions About the Quality of The Lesson*, *Expressions About the Teacher*, *Expressions Including Affective Factors* and *Other*. Findings for all categories are given in Table 6.

Table 6: The reasons for the difficulties experienced by students in distance education for math lessons

| Reasons | Frequency (f) |
|---|---------------|
| <i>Expressions about Physical Environment</i> | |
| There was a problem with the internet. | 180 |
| I could not attend the courses. | 37 |
| I can't focus. | 29 |
| I find it difficult because there is no face-to-face interaction. | 24 |
| There is noise in online lessons. | 13 |
| It's not like a school environment/ Face-to-face education is easier. | 8 |
| My course time was the same with my siblings and it was not my turn. | 7 |
| It's hard to stay in front of the screen for hours/our eyes hurt. | 5 |
| I had necessities (tablet, computer, internet). | 3 |
| I am not used to distance education. | 3 |
| I don't understand because the screen is small. | 3 |
| I'm just watching the screen. | 1 |
| Total | 311 |
| <i>Expressions about Learning Environment</i> | |
| I have difficulty in understanding what my teacher is saying. | 138 |
| It's hard to ask about the things I don't understand in distance education. | 11 |

| | |
|--|------------|
| Time is not enough, and it passes quickly. | 10 |
| I fell behind on the subjects. | 9 |
| I can't take notes. | 7 |
| I forgot the subjects I saw / the subjects are not consolidated enough / we cannot repeat the lessons. | 4 |
| We could not attend regular classes because the attendance was low. | 4 |
| I couldn't get results from the lessons. | 3 |
| We couldn't solve many tests/questions. | 2 |
| Since I did not understand the lesson, my participation in the lesson decreased. | 2 |
| There is no discipline like in the school environment. | 1 |
| Total | 191 |
| <i>Expressions about the Nature of the Lesson</i> | |
| Mathematics is a difficult subject. | 12 |
| I'm having a hard time solving questions/next generation questions. | 6 |
| Total | 18 |
| <i>Expressions about Affective Factors</i> | |
| My interest/motivation in the lesson decreased/I was distracted. | 5 |
| I am boring in the lesson. | 4 |
| I am afraid of not understanding the subject. | 1 |
| Total | 10 |
| <i>Expressions about the Teacher</i> | |
| The teacher cannot explain in detail/sufficiently in the online course. | 5 |
| Our teacher is not interested in the lesson. | 1 |
| Our teacher covers the topics quickly. | 1 |
| Total | 7 |
| <i>Other Expressions</i> | |
| I have difficulties in distance education, I don't know why. | 8 |
| I've had health/sleep problems. | 8 |
| Distance education is bullshit. | 1 |
| Total | 17 |
| GENERAL TOTAL | 554 |

When Table 6 is examined, it can be said that the difficulties experienced by the students in the mathematics lesson are generally due to the difficulties experienced in *accessing the internet* and *not being able to understand the teacher*. Apart from this, some students stated that *mathematics was a difficult lesson, the teacher could not explain the lesson efficiently in the online environment, and they lost their motivation towards the lesson*. Some students, on the other hand, expressed the problems they experienced in the course due to the health problems they experienced due to the distance education process.

3.3 Did the Distance Education Process Have any Effects on Students' Love/Interest in Mathematics Lesson?

Regarding the third sub-problem of the study, 621 students (84%) said that they liked the course, while 119 students (16%) said that they did not like it. Students who answered *I love the course* gave answers in different categories such as: *It Did Not Affect My Love for the Lesson, It Had a Negative Effect on My Love for The Lesson, It Had a Positive Effect on My Love for the Lesson*.

Table 7: Expressions of students responding *I love the lesson*

| Expressions | Frequency (f) |
|---|---------------|
| <i>No Effect</i> | |
| I already liked the lesson; distance education had no effect. | 259 |
| I still love math because I love my teacher. | 35 |
| Total | 294 |

| | |
|---|------------|
| <i>Negative Effect</i> | |
| I like math less with distance education. | 57 |
| With distance education, my motivation/interest towards the lesson decreased. | 47 |
| Total | 104 |
| <i>Positive Effect</i> | |
| I liked the lesson more with distance education. | 61 |
| Total | 61 |
| I force myself to love the lesson in distance education. | 2 |
| Total | 2 |
| GENERAL TOTAL | 461 |

When the student expressions in Table 7 are examined, it is seen that distance education has no effect on the love of mathematics for most of the students (63%) who love mathematics, have a negative effect on these students' love for mathematics (23%), and have a positive effect on their love for mathematics (13%). Related answers are given in Table 8. Within this sub-problem of the study, the expressions of the students who answered that *I do not like mathematics*, it was seen that they gave the answers that *it did not affect my love for the course*, and *it had a negative effect on my love for the course*. Related answers are given in Table 8.

Table 8: Expressions of students responding *I don't love the lesson*

| Expressions | Frequency (f) |
|--|----------------------|
| <i>No Effect</i> | |
| Distance education had no effect on my love for the lesson. | 29 |
| Total | 29 |
| <i>Negative Effect</i> | |
| Because of distance education, I don't like the lesson / I am alienated from the lesson. | 12 |
| There is nothing to love about mathematics in distance education. | 4 |
| Total | 16 |
| GENERAL TOTAL | 45 |

According to the data in Table 8, it can be said that the distance education process has no effect on the love of the students who do not like the mathematics lesson in general. However, it is seen that some students stated that they became even more alienated from the course during the distance education process.

4. Discussion

In this study, it was seen that most of the students in the sample group (84%) preferred face-to-face education. It has been seen that the two most important factors in students' preference for face-to-face education are *understanding the lesson and technical problems*, respectively. The students stated they understood the lesson better, they could learn for a longer period, could solve more questions depending on the student-teacher interaction and they had more permanent learnings in face-to-face environments, and they especially preferred the mathematics lessons to be taught in face-to-face environments. Besides, they stated that face-to-face lessons are generally more fun, and they are boring in online lessons. The reasons for students who prefer distance education mostly consist of statements about health reasons and home environment to be more comfortable. Most of the students (63%) stated that they had difficulty in understanding the mathematics lessons during the pandemic, and they stated that the reasons for this difficulty were the problems of achieving the internet and not being able to understand the teacher, respectively. When the reasons for not understanding the teacher are examined, it is seen that the students generally use expressions such as *there is a lot of noise, I cannot focus on the lesson, I cannot ask where I do not understand, I cannot take notes, I forget what is explained because there is not enough repetition, we do not solve enough questions in the lesson, the teacher cannot explain enough, mathematics is difficult, my motivation is low, I am boring, etc.* In the question of whether the lessons conducted during the pandemic process influenced their love for the mathematics lesson, most of the students answered that they already liked the lesson, so it did not have any effect. 23 % of the students said they liked the lesson, but their love for the lesson decreased

during the pandemic. Nevertheless, 6% of all students who participated in the study stated that they did not like the lesson. Most of the students in this group stated that distance education did not influence their love for the lesson, while some students stated that distance education alienated them from the lesson even more.

According to the data obtained from the study, it can be said that the students generally prefer to interact with the teacher in face-to-face course environments. Related findings obtained from the study are consistent with the results of different studies in the literature. Kaynar, Kurnaz, Doğrukök, and Şentürk Barışık (2020), one of these studies, state that secondary school students find face-to-face education more beneficial than online education. Özüdoğru and Bulut (2021), on the other hand, examined the 8th grade students' opinions about the mathematics courses conducted during the Covid-19 pandemic process, and they stated that the students could not understand the lessons and they could not access the digital resources in this process. Başaran, Doğan, Karaoğlu, and Şahin (2020) examined the opinions of students, teachers and parents on distance education and revealed problems such as *not being suitable for individual differences, limited interaction, students' not participating actively in the lesson, and technical problems for these processes*. In the same study, the requirements such as *inequality of opportunity, content, infrastructure, material development and improvement were stated*. Özdoğan and Berkant (2020), in their research in which they examined stakeholder views, put forward the advantages of distance education such as *providing time-space independence, re-watchability of courses, and protection against disease transmission but they have also revealed that it has disadvantages such as loss of motivation, lack of measurement-evaluation, lack of computer-internet, inequality of opportunity in education and technical problems*. They also included solution proposals such as creating equal opportunities and strengthening the infrastructure. Therefore, it can be said that the opinions of students about online mathematics courses in Turkey emphasize common points and that the students are not satisfied with the courses conducted in this process. In parallel with this result, the study of Özçakır Sümen (2021) can be cited. Although the study was carried out for the primary school level, it is thought that the results will be useful as a discussion point. Özçakır Sümen (2021), in her case study on how primary school mathematics lessons are being conducted in the distance education process, revealed that teachers plan their mathematics lessons well, they enter the lesson with a good preparation, they use different methods and techniques in the lessons, and mainly support the lesson with technological materials. However, it has been revealed that 30 minutes of course time is not enough to explain mathematics subjects, solve questions and make students to comprehend it for distance education. It has been observed that there are mainly difficulties in classroom management. Hebebcı, Bertiz, and Alan (2020) in their study in which they examined the views of teachers and students regarding the distance education activities carried out during the pandemic, stated that the students did not understand the teachers in the distance education process and found them inadequate. At the same study, the students did not find online activities satisfactory due to the lack of time and infrastructure.

When the international publications examining the opinions of the students about the mathematics lessons carried out during the pandemic process are examined, it is seen that similar results have been reached. In the study of Mukuka, Shumba, and Mulenga (2021), in which they examined the opinions of 367 secondary school students about mathematics lessons during the pandemic process in Zambia, most of the students believed that mathematics is a lesson that can be learned with face-to-face education. In the same study, it was reported that 56% of the students did not have online resources during the pandemic process and therefore they had difficulties in accessing the courses and providing motivation. In the study of Das (2020), in which he brought together different types of participants, most of the participants accepted online teaching as a barrier to mathematics education. In their study, Wardani, Mardiyana and Saputro (2021), in which they determined the opinions of 11th grade students about the mathematics lessons carried out during the pandemic process through a survey, 46% of the students found that online mathematics learning was ineffective, 27% very ineffective, 17% effective and 10% found it to be effective. The students expressed the obstacles they experienced in this process as *unstable internet network, limited internet quota, lack of time for discussion and collecting homework, and too much homework*. Tezer, Cavus Orkun, Osum and Türe (2021), in their study examining primary school students' views on mathematics lessons during the COVID-19 pandemic process, stated that fifth grade primary school students in Northern Cyprus have difficulty in understanding online lessons and need help while doing their homework. Schult, Mahler, Fauth, and Lindner (2022) state that the mathematics courses conducted during the pandemic process, cause mathematics learning losses in the 5th grade students who have a low socio-cultural level in Germany. Apart from these, a study conducted in Jordan by Abuhammad (2020) addresses the personal, logistical,

and technical barriers associated with the distance learning during the COVID-19 quarantine. Another study conducted in Bangladesh by Al-Amin, Zubayer, Deb and Hasan (2021) reported that limited access to the internet and electricity are among the biggest barriers to distance learning in most developing countries. Zhang, Wang, Yang and Wang (2020) also reports that *the weakness of the online teaching infrastructure, the inexperience of teachers, the knowledge gap, and the complex home environment are undermining student learning during COVID-19.*

The literature review within the scope of this study was carried out regarding the mathematics courses during the pandemic process, depending on the purpose of the study. The reason for this situation is to be able to determine the effects of mathematics lessons, conducted all over the world, on students during the pandemic process, to evaluate the process in this context and to reveal the measures to be taken for effective mathematics teaching. Therefore, the discussion part of the study was limited to mathematics learning processes, and it was aimed to reveal field-specific results. When the national and international studies are examined, it is seen that different problems related to the mathematics learning processes carried out in online environments were expressed by the students. The main problems revealed in these studies are *the difficulties in accessing the internet and the inability to understand the lesson.* It can be said that the situation of not being able to understand the lesson expressed here is mostly due to the disconnections in the teacher-student interaction. These disconnections can sometimes be caused by the internet. The reasons expressed by the students as the reasons for not being able to understand the lesson as a result of this study, also support this situation. The students used expressions such as *I cannot focus on the lesson, I cannot ask where I do not understand, I cannot take notes, the teacher cannot explain enough, etc.* However, according to the results of different studies, it is seen that the students generally think that the mathematics course can be learned in face-to-face environments. It is thought that the main reason for this situation is similarly related to student-teacher interaction. In different studies in the literature (Arora & Srinivasan, 2020; Barış & Çankaya, 2016; Chen, Ou, Liu, and Liu, 2001; Jin, 2005; Kaya & Önder, 2002) problems related to student-teacher interaction are also mentioned. Wahyuningrum and Latifah (2020), one of them, stated in their study that teachers do not act to encourage mathematical conversation in online lessons and do not make students active in this regard. However, Chakanyuka, Chiome, and Chabaya (2008) and Özköse, Arı, and Çakır (2013) argue that problems related to interaction can be solved by training teachers and students.

Another remarkable result of the literature review is student motivation. It is seen that students generally think that mathematics is a difficult lesson, so it is very difficult for them to understand this lesson in online lessons. However, the students stated that they lost their motivation towards the lesson on online platforms, and they were boring in the lesson. Therefore, it can be said that one of the ways to attract students to the online lessons is to improve their attitudes towards the lesson.

5. Conclusion

This study was carried out in order to reveal the opinions of students in Turkey about the mathematics learning process during the Covid-19 pandemic, and as a result of the study, it was seen that the students generally drew a negative picture. When the literature is examined, it is seen that similar results have been obtained from different studies conducted in many countries. It is difficult to say that this is an unexpected result for distance education applications that are carried out in different environments by breaking away from traditional education in a very short time. Because teachers and students who are not accustomed to distance education and who do not have enough knowledge and preparation for it, have lived this experience for the first time. Therefore, it is expected that students will have difficulties in this process. However, it is obvious that the pandemic process gives an idea about the obstacles that may be encountered if distance education is needed in the next days. The aim of this study is to reveal these obstacles and to develop solutions. Therefore, when it comes to mathematics education, some suggestions can be made about accessing digital resources and understanding mathematics, which can be expressed as the two biggest obstacles for distance education. The first of these recommendations is about access to digital resources. In order to avoid disruptions in distance education processes, countries should ensure equal opportunities for students and find ways to access digital resources (internet, computer, tablet, etc.) as much as possible for each student. Although this proposal is not easy to implement (Ahedor, 2020; Camacho-Zuniga, Pego, Escamilla, and Hosseini, 2021; Oyediran, Omoare, Owoyemi, Adejobi, and Fasasi (2020), it is a known fact that

the inadequacy of digital resources lies at the root of the disruptions. Apart from this, when considered on a local basis, schools can support their students for getting knowledge about digital resources (e-books, software, digital games, online trainings, videos, webinars, etc.). Students can be encouraged to carry out technology supported projects and educational activities using digital resources can be carried out by schools. In addition, students can be informed about accessing online resources, so they can reach a better level of using these resources. Besides, it can be ensured that especially teachers are informed about the learning activities to be carried out on online platforms. It is thought that the trainings to be given to teachers and students regarding distance education will contribute to overcoming many obstacles. In addition to all these problems, it is known that one of the biggest obstacles in front of students in distance education processes is their attitude towards the mathematics. For this reason, it is thought that informing students about why mathematics is a lesson to be learned and its usage areas in life will increase their motivation towards the lesson and help them change their negative attitudes.

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