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TEACHER, STUDENT AND PARENTS VIEWS ON ELEMENTARY SCHOOL MATHEMATICS LESSON DURING DISTANCE EDUCATION PROCESS

Research article

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Abstract

This study investigated the perspectives of primary school teachers, students, and parents on fourth-grade mathematics distance education during the 2020-2021 academic year. Using a qualitative research approach with a case study design, the research included 11 fourth-grade teachers, 12 students, and 12 parents from official primary schools in Çerkezköy, Tekirdağ province, Turkey during the spring semester of the 2021-2022 academic year. Criterion sampling principles were followed for participant selection. Data collection involved semi-structured interviews, and content analysis was employed for analysis**.** According to the findings of the study, the classroom teachers highlighted the benefits of distance education, such as increased parental support, uninterrupted learning, and self-directed student learning, whereas the challenges included supervision difficulties, assessment reliability, limited one-on-one teaching, and extended screen time. The students found positive aspects in the seamless continuation of learning during distance education but faced challenges such as short lesson durations, technical issues, and inadequate teaching materials. The parents noted positive effects on their children's mathematics learning, including educational continuity and independent learning, whereas the challenges included the lack of one-on-one teaching, reliance on technology, and adaptation issues.

Keywords: Distance education; mathematics; primary school mathematics teaching

1. Introduction

In Turkey, as in other countries around the world, educational activities were affected by the global pandemic. The first case of Covid-19 in Turkey was reported on March 11, 2020. The Ministry of National Education in Turkey (MEB) declared a two-week school break as of March 16, 2020 (Ministry of National Education (MONE), 2020). As the number of cases rapidly increased, the initially planned two-week break period was extended. During this period, educational activities were conducted through distance education (DE) via television and the internet. The participation of students and teachers in online classes during distance education was facilitated through the Education Informatics Network (EBA) platform. Additionally, EBATV was established through the Turkish Radio and Television Corporation (TRT), announcing compensatory education for students from first grade to twelfth grade (Koca, 2021). The Ministry of National Education initiated full-time face-to-face education for some educational levels during the 2020-2021 academic year. However, for certain levels, a combination of in-person and distance education was implemented, with teachers delivering the curriculum through distance education. In the 2021-2022 academic year, face-to-face

education was resumed for all levels (MONE, 2020a; MONE, 2020b; MONE, 2020c; MONE, 2020d; MONE, 2020e; MONE, 2021; MONE, 2021a; MONE, 2021b; MONE, 2021c).

In the literature, studies were identified on primary school mathematics lessons conducted during the pandemic (Kalogeropoulos et al., 2021; Kılıç, 2022; Özçakır Sümen, 2021; Rahayu at al., 2020; Toptaş and Öztop, 2021; Yazıcı, 2021). These studies primarily involved primary school students and classroom teachers. However, no specific study was found that focused on primary school mathematics lessons and involved parents, who played a crucial role in distance education and maintaining the connection between teachers and students. Existing studies did not provide sufficient data on how learning gaps in primary school mathematics lessons during distance education were addressed, which topics students found challenging to learn, the positive and negative effects of distance education according to students, and the observations of parents during this process.

According to the data from the Trends in International Mathematics and Science Study (TIMSS), Turkey ranks 23rd among 58 participating countries in terms of fourth-grade mathematics achievement levels (MONE, 2020f). It is observed that the performance of fourth-grade students in mathematics lessons conducted through face-to-face education is low. According to data from another international exam, the Program for International Student Assessment (PISA), Turkey ranks 42nd out of 79 countries in the mathematics achievement rankings for students in the 15-year-old age group (MONE, 2019). The importance of mathematics lessons conducted during the distance education process becomes even more crucial in this context. This is because deficiencies in mathematics lessons during distance education may negatively impact students' future academic achievements and even their career choices. Therefore, it is thought that the research, by gathering the opinions of fourth-grade teachers, fourth-grade students, and parents regarding the mathematics lessons conducted through distance education in the 2020-2021 academic year, will contribute to the literature in identifying the challenges faced during the process, determining students' learning deficiencies, proposing solutions to address those deficiencies, and identifying the specific mathematical topics where difficulties arise.

The conducted research will provide information on the positive and negative effects of distance education on students' learning in fourth-grade mathematics lessons, based on the perspectives of classroom teachers, students, and parents. Teachers', students', and parents' shared experiences will serve as a guide for different teachers, students, and parents in potential future distance education processes. The research, in this context, aims to answer the following questions:

1) According to fourth-grade primary school teachers, what are the effects of distance education (UE) on students' mathematics learning?

2) According to fourth-grade primary school students, what are the effects of distance education (UE) on their own mathematics learning?

3) According to the parents of fourth-grade primary school students, what are the effects of distance education (UE) on their children's mathematics learning?

2. Materials and Methods

This research, aiming to examine the views of fourth-grade primary school teachers, students, and student parents regarding primary school mathematics lessons conducted during the distance education process, utilized a qualitative research method. The qualitative research method focuses on in-depth examination of facts/events in a predetermined direction (Yıldırım and Şimşek, 2018).

The research aims to comprehensively examine the experiences and comments of the participants regarding primary school mathematics lessons conducted during the distance education process. Therefore, a qualitative research design, specifically the case study design, was chosen. The case study design focuses on phenomena that are recognized but not thoroughly understood, aiming to provide a detailed understanding (Yıldırım and Şimşek, 2020).

2.1. Participants

The study group of this research consists of 11 (2 male, 9 female) fourth-grade primary school teachers teaching in official primary schools affiliated with the Ministry of National Education in Çerkezköy district of Tekirdağ province during the 2021-2022 academic year. Additionally, there are 12 (6 female, 6 male) fourth-grade primary school students and 12 (female) parents in the group.

During the determination of the study group, the criterion sampling method was employed. This sampling method allows the selection of the study group by the researcher based on one or more criteria, or by utilizing pre-determined criteria (Yıldırım ve Şimşek, 2018). The criteria used in forming the study group included the participation of both teachers and students in fourth-grade distance education mathematics lessons during the 2020-2021 academic year, as well as their continued participation in face-to-face education during the 2021-2022 academic year. The parents participating in the research were selected from the parents of the fourth-grade students who were part of the study.

2.2.Data Collection Tools

Semi-Structured Interview Form: It facilitates the study by having a specific standard and flexibility (Türnüklü, 2000). In the research, three separate interview forms were prepared by the researcher with the aim of gathering the opinions of the fourth-grade primary school teachers, fourth-grade students, and parents on mathematics lessons during the distance education process. A draft consisting of planned questions for this form was prepared. This draft of questions was presented to the academics specializing in the field, and after a pilot application, it was finalized. During the interviews, the interviewer asked each participant to provide detailed explanations for their answers to the posed questions.

In this research, a literature review on the subject was conducted while preparing the semi-structured interview forms. Expert opinions were sought for the nature of the prepared questions, and feedback was obtained from a panel consisting of 3 experts in computer and technology education, 2 experts in mathematics education, 1 expert in Turkish education, and 1 expert in educational programs. Additionally, the questions were administered to 1 fourth-grade teacher, 1 fourth-grade student, and 1 student's parent. Based on the feedback from

experts and the perspectives of the teacher, the student, and the parent, six mutually supportive questions were determined.

2.3. Data Collection and Analysis

Data collection took place during the spring semester of the 2021-2022 academic year. While collecting the data, the researcher visited the selected schools and reached out to the teachers based on the recommendation of the school principals. Following the criteria of the research, the teachers were initially identified. After consulting with the teachers, the students and their parents were included in the research based on the predetermined criteria. The purpose of the research was clearly explained to the teachers, students, and parents before conducting interviews. Voluntary Informed Consent Form and Participation Acceptance Form were signed by the teachers and parents to obtain permission. Since the students were under the age of eighteen, Parental Consent Form was signed by the parents to obtain permission. Additionally, the participants were informed that their personal information would be protected, and that participation in the research was based on voluntary consent. Interviews were conducted face-to-face in the teachers' lounge. To save time during the interviews and not to distract the participants' attention, verbal consent was obtained, and audio recording was made with the permission of the interviewees.

The data obtained in the research were analyzed using the content analysis method. The purpose of content analysis is to bring together similar data within certain concepts and themes (Yıldırım and Şimşek, 2018). During the data analysis process, the collected data were first transcribed and transferred to a Word document. Each teacher was denoted as T1, T2, … T11, each student as S1, S2, … S12, and each parent as P1, P2, … P12. The findings were presented based on the questions in the interview form. The results were presented in tables, and the opinions obtained from teachers, students, and parents were used in the interpretation stage by making direct quotations from the tables to substantiate the information provided.

3. Results

3.1. The effect of distance education on students' mathematics learning according to fourth-grade primary school teachers

Table 1. *Themes Created Regarding the Effects of Distance Education on Students' Mathematics Learning According to Fourth-Grade Primary School Teachers*

Themes	f	Participants
Positive Effects	10	T1, T2, T3, T4, T5, T6, T7, T9, T10, T11
Negatives Effects	11	T1, T2, T3, T4, T5, T6, T7, T8, T9, T10, T11

When looking at Table 1, the fourth-grade primary school teachers expressed 10 opinions related to the theme "Positive Effects" and 11 opinions related to the theme "Negative Effects." Codes related to the themes are presented in Table 2 and Table 3.

Table 2. *Codes Related to The Theme "Positive Effects" (Teacher)*

Themes	Codes	f	Participants
Positive Effects	Increased parental support	5	T1, T2, T3, T4, T10
	Continuation of students' learning	4	T2, T3, T6, T11
	Ability of students to realize their own learning	4	T5, T7, T9, T11
	Use of technological devices	3	T2, T4, T10
	Absence of time and space constraints	1	T2
	Increase in problem-solving	1	T2
	Richness of instructional materials	1	T1

When looking at Table 2, it is observed that the fourth-grade primary school teachers expressed their opinions most frequently under the code "Increased parental support" (f=5). The other identified codes are listed as "Continuation of students' learning" (f=4), "Ability of students to realize their own learning" (f=4), "Use of technological devices" (f=3), "Absence of time and space constraints" (f=1), "Increase in problem-solving" (f=1), and "Richness of instructional materials" (f=1). The opinions of the fourth-grade teachers named T1 and T11 on this matter are as follows:

T1: "One of the most positive effects was the increase in the relationship we established with parents".

T11: "It was a good alternative to be used in situations where education could not continue face-to-face. The children did not fall behind in their lessons. Students learned that they could easily find something they cannot understand or do in mathematics using the internet".

Table 3. *Codes Related to The Theme "Negative Effects" (Teacher)*

Themes	Codes	f	Participants
Negative Effects	Difficulty in supervision	5	T1, T2, T4, T5, T8
	Low reliability of measurement and evaluation	5	T5, T6, T8, T9, T11
	Inability to conduct one-on-one teaching	4	T1, T5, T8, T11
	Extended screen time	4	T3, T4, T6, T8
	Increase in cheating behavior	3	T2, T4, T5
	Inability to concretize concepts	3	T5, T7, T9
	Decrease in problem-solving	3	T6, T8, T11
	Short duration of lessons	3	T8, T9, T11
	Inability to use peer-supported teaching methods	2	T2, T8
	Technological difficulties	2	T3, T5
	Complication of homework tracking	2	T5, T9
	Widening gap in skill levels among children	2	T8, T10
	Difficulty in providing feedback during lessons	2	T4, T5
	Difficulty reaching children with learning difficulties	2	T7, T11
	Parental intervention in classes	1	T6
	Technological tools making children lazy	1	T8
	Inability to provide reinforcement to children	1	T6

When looking at Table 3, examining the codes created based on the opinions of the classroom teachers, the codes with the highest frequency values are observed to be "Difficulty in supervision" (f=5) and "Low reliability of measurement and evaluation" (f=5). Following these codes in terms of frequency are "Inability to conduct one-on-one teaching" (f=4), "Extended screen time" (f=4), "Increase in cheating behavior" (f=3), "Inability to concretize concepts" (f=3), "Short duration of lessons" (f=3), "Decrease in problem-solving" (f=3), "Inability to use peer-supported teaching methods" (f=2), "Technological difficulties" (f=2), "Complication of homework tracking" (f=2), "Widening gap in skill levels among children" (f=2), "Difficulty in providing feedback during lessons" (f=2), "Difficulty reaching children with learning difficulties" (f=2), "Parental intervention in classes" (f=1), "Technological tools making children lazy" (f=1), and "Inability to provide reinforcement to children" (f=1). Regarding this question, the opinions of the classroom teachers named T2 and T7 are as follows:

T2: "...one of the negative effects is the difficulty in supervision during the lesson... I could use peer-supported learning method in face-to-face education, but I couldn't use this method in online education. This had a negative impact, especially for students with learning difficulties".

T7: "I struggled both in explaining topics that needed to be concretized and the children had difficulty in understanding. There were differences in the levels among the children... In

distance education, children with lower understanding and learning levels for their age were getting bored more quickly and didn't want to participate in the lessons".

3.2. *The Effect of Distance Education on Fourth-Grade Primary School Students' Own Mathematics Learning*

Table 4. *Themes Created for The Effects of Distance Education on Fourth-Grade Primary School Students' Own Mathematics Learning*

Themes	f	Participants
Positive Effects	8	S2, S3, S4, S5, S6, S7, S8
Negative Effects	12	S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12

When looking at Table 4, 8 fourth-grade primary school students expressed their opinions on the "Positive Effects" theme, and 12 students provided their views on the "Negative Effects" theme. Table 5 and Table 6 include the codes related to these themes.

Table 5. *Codes Related to The Theme "Positive Effects" (Student).*

Themes	Codes	f	Participants
Positive Effects	Continuation of learning	6	S2, S3, S4, S5, S7, S8
	Increase in problem-solving	1	S2
	Short duration of lessons	1	S11
	Use of technological devices	1	S6

When looking at Table 5, it is observed that the fourth-grade primary school students mostly expressed their views on the code "Continuation of learning" (f=6). The other identified codes are listed as "Increase in problem-solving" (f=1), "Short duration of lessons" (f=1), and "Use of technological devices" (f=1). Regarding this, the opinions of the students S5 and S11 are as follows:

S5: "Thanks to distance education, we could cover our math lessons. I could follow our teacher's lesson".

S11: "The lesson durations became shorter. We could finish our lessons without getting bored".

Table 6. *Codes Related to The Theme "Negative Effects" (Student)*

Themes	Codes	f	Participants
Negative Effects	Short duration of lessons	9	S1, S2, S4, S5, S6, S8, S9, S10, S12
	Technological problems	7	S2, S3, S5, S6, S7, S8, S11
	Insufficiency of instructional materials	6	S2, S4, S5, S7, S9, S10
	Communication problems	3	S4, S5, S10
	Decrease in problem-solving	3	S6, S7, S12
	Negative learning environment	2	S4, S9
	Inability of the teacher to effectively present the lesson	2	S10, S12
	Decrease in social interactions	2	S1, S7
	Inability to prepare for the lesson at home	1	S1

Table 6 shows that the opinions of the fourth-grade elementary school students about the negative effects of distance education on their mathematics learning are mostly gathered under the code "Short duration of lessons" (f=9). In terms of frequency, the other codes are ranked as follows: "Technological problems" (f=7), "Insufficiency of instructional materials" (f=6), "Communication problems" (f=3), "Decrease in problem-solving" (f=3), "Negative learning environment" (f=2), "Inability of the teacher to effectively present the lesson" (f=2), "Decrease in social interactions" (f=2), and "Inability to prepare for the lesson at home" (f=1). Regarding this issue, the opinions of the students S1 and S10 are as follows:

S1: "I couldn't understand the topics because I participated in the class without waking up. I couldn't focus because I couldn't be in the same environment with my friends. Since the lesson hours were short, I had to learn on my own".

S10: "Our teacher couldn't explain the topics as well as in face-to-face education. I couldn't understand the topics because the lesson durations were short. Sometimes when I asked for permission to ask a question that I didn't understand, our teacher didn't see it. I couldn't ask questions. I attended classes using a tablet, but I didn't like this situation at all".

3.3. The Effect of Distance Education on Students' Mathematics Learning According to Student Parents

Table 7. *Themes Created for The Effect of Distance Education on Children's Mathematics Learning According to Student Parents*

Themes	f	Participants
Positive effects	12	P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12
Negative effects	10	P1, P2, P3, P4, P5, P6, P7, P8, P9, P11

When looking at Table 7, 12 student parents expressed their views on the "Positive Effects" theme, and 10 student parents expressed their views on the "Negative Effects" theme. Table 8 and Table 9 provide details on the codes related to these themes.

Table 8. *Codes Related to the "Positive Effects" Theme (Parents)*

Themes	Codes	f	Participants
Positive Effects	Continuation of education	9	P2, P3, P4, P5, P7, P8, P10, P11, P12
	Self-realization of students' learning	4	P8, P9, P11, P12
	Teacher's professional competence	2	P1, P2
	Short duration of lessons	1	P3
	Students' participation in the learning process	1	P6

When looking at Table 8, it is observed that the student parents expressed their views most about the code "Continuation of education" (f=9). The other identified codes are listed as follows: "Self-realization of students' learning" (f=4), "Teacher's professional competence" (f=2), "Short duration of lessons" (f=1), and "Students' participation in the learning process" (f=1). In this regard, the opinions of the parents P3 and P6 are as follows:

P3: "If it weren't for distance education, he would fall behind in his classes. Thanks to distance education, he made progress. He continued to attend classes as if they were face-to-face. It was also good that the class durations were short because when the time they had to focus was short, he didn't get bored. He listened more attentively to the lessons".

P6: "When he couldn't ask his teacher about a topic he didn't understand during the lesson, either I or his brother could explain it right away. Our involvement in our child's learning process prevented him from falling behind in his lessons. Also, I think our increased communication with the teacher during this process contributed to our child's success".

Table 9. *Codes Related to The "Negative Effects" Theme (Parents)*

Themes	Codes	f	Participants
Negative Effects	Lack of one-on-one instruction	4	P4, P5, P6, P7
	Dependency on technology	4	P4, P5, P6, P9
	Adaptation issues	4	P2, P5, P7, P8
	Technological problems	3	P3, P4, P11
	Insufficiency of teaching materials	3	P1, P5, P7
	Short duration of lessons	2	P4, P9
	Communication issues	2	P2, P8
	No obligation to attend	2	P4, P5
	Decrease in problem-solving	1	P2
	Short break times	1	P4
	Long screen times	1	P6
	Decrease in topic review	1	P8

Table 9 shows that the parents expressed more opinions about the factors that negatively affected their children's mathematics learning in the context of distance education. The codes with the highest frequency values are "Lack of one-on-one instruction" (f=4), "Dependency on technology" (f=4), and "Adaptation issues" (f=4), as seen in the table. The other created codes and their frequency values are as follows, respectively: "Technological problems" (f=3), "Insufficiency of teaching materials" (f=3), "Short duration of lessons" (f=2), "Communication issues" (f=2), "No obligation to attend" (f=2), "Decrease in problem-solving" (f=1), "Short break times" (f=1), "Long screen times" (f=1), and "Decrease in topic review" (f=1). The opinions of the parents V4 and V6 on this matter are as follows:

P4: "MY child couldn't establish a connection with the teacher. In the classroom, the teacher could intervene immediately for a question the child couldn't solve, but unfortunately, such a situation could not happen in distance education. ...When we started attending classes, EBA was constantly kicking us out of the lesson. As a result, my child was getting bored. He didn't want to attend the class. The short duration of lessons also had a negative impact because entering and exiting the class happened simultaneously. This would distract the child. He was confused about which class to focus on. My child didn't know much about online games before. But after getting an internet connection, he could access everything. Internet addiction developed".

P6: "My child was reluctant to attend classes because he couldn't communicate with the teacher one-on-one. While the teacher was lecturing, my child was sometimes playing games... Having six class hours a day was too much for my child".

4. Discussion and conclusion

This research aims to determine the positive and negative effects of distance education on students' mathematics learning by gathering the opinions of fourth-grade elementary school teachers, fourth-grade students, and their parents regarding the mathematics lessons conducted remotely during the 2020-2021 academic year.

In the study, it was observed that the fourth-grade elementary school teachers provided responses regarding both positive and negative effects on their students' mathematics learning during the process of distance education. According to the teachers, the positive effects included increased parental support, the continuity of students' learning, and students' ability to carry out their own learning. On the other hand, the negative effects involved difficulties in monitoring students, low reliability in assessment and evaluation, and the impossibility of conducting one-on-one teaching, among other factors. Looking at the existing studies in the literature, it was found that one of the advantages of distance education was the increased parental involvement in mathematics teaching (Ergen at al., 2022). Among the negative effects of distance education on primary school mathematics lessons were the short duration of lessons, multiple technical problems, and lack of communication (Kalfopoulou at al., 2022). The positive aspects of primary school mathematics lessons conducted through distance education included students not being disconnected from the process, parents being involved in the process, and the abundance of topic repetition. On the other hand, the negative aspects involved the inability to receive feedback from students, failure to reach every student, and the lack of mutual interaction (Batdal Karaduman at al., 2021).

In the study, it was observed that the fourth-grade primary school students provided responses regarding both positive and negative effects of distance education on their mathematics learning. According to their comments, the positive effects of distance education

on mathematics learning included the continuation of learning, an increase in problem-solving, short lesson durations, and the use of technological devices. On the other hand, the negative effects involved short lesson durations, technological problems, inadequacy of teaching materials, communication problems, and a decrease in problem-solving. Upon examining the results, it is noted that the students mentioned both an increase and a decrease in the number of problem-solving activities during distance education. This discrepancy might be attributed to differences in the teaching methods employed by teachers during the distance education process. Although short lesson durations are considered among the positive effects, most students evaluated them as negative effects. Among the positive outcomes, a student's response might stem from a sense of boredom with prolonged lessons. Although existing literature lacks a dedicated exploration of the impact of distance education on the mathematical learning of primary school students, analogous studies were undertaken. The benefits of distance education encompass continuous learning, reinforcement, and the cultivation of self-directed learning skills. Conversely, drawbacks include the absence of timely feedback, an inability to fully substitute traditional face-to-face instruction, brief lesson durations, and technical hitches (Başaran at al., 2020). A study involving primary school students in the realm of distance education revealed that a significant number of students encountered technological challenges while participating in live classes (Kılınç, 2021). In another study involving primary school students and their experience with distance education, it was observed that students commonly perceived the allotted lesson durations as insufficient (Yurtbakan and Akyıldız, 2020).

Research findings suggest that, as reported by the parents, distance education exerts both positive and negative influences on their children's mathematical learning. According to the parents of the students, the positive impacts encompassed the seamless continuation of their children's education, the empowerment of their independent learning capabilities, and a high regard for the teacher's professional competence. On the other hand, the identified negative effects involved the absence of personalized, one-on-one teaching, reliance on technology, challenges in adapting to the online environment, technological disruptions, and a perceived inadequacy of teaching materials. Despite a dearth of specific studies on the effects of distance education on primary school students' mathematics lessons from the parental perspective in the literature, general insights from studies capturing the viewpoints of primary school student parents about distance education are available. For instance, it was observed that parents seldom encountered technical issues during the distance education process (Mengüç, 2022). According to the parents of primary school students, the advantages of distance education extended to fostering the recognition of the importance of teacher-parent collaboration, providing protection from illnesses, and ensuring the continuity of educational practices (Yağcı, 2022).

As per the perspectives of the primary school student parents, a commendable aspect of distance education is its role in averting students from disengaging with their lessons. Conversely, identified drawbacks included the potential for fostering computer and internet addiction in children and impeding opportunities for face-to-face interactions with teachers (Taş, 2005). Notably, there are notable parallels between the outcomes of this research and the cited exemplar studies. However, it is worth highlighting a divergence in findings from one particular study where parents attributed their challenges with distance education to perceived lack of teacher interest and inadequate instructional support, a contrast to the results obtained in this research (Üstündağ, 2021).

5. Suggestions

Comprehensive research studies can be undertaken to explore both the positive and negative impacts of distance education on primary school mathematics lessons. These investigations should encompass both official and private schools, spanning across every province, district, and village throughout Turkey.

Dedicated studies can be conducted to investigate the various solutions that teachers and parents employ to address potential learning deficiencies in mathematics lessons facilitated through distance education.

Initiatives can be established to provide training sessions for primary school parents. These sessions should focus on imparting valuable methods and techniques aimed at enhancing the efficiency of their children's mathematics study during the distance education process.

6. Ethical Statement

The necessary permission for the study was obtained through the decision of the Research and Publication Ethics Committee of the School of Graduate Studies at Çanakkale Onsekiz Mart University (date: 06.01.2020; number: E-84026528-050.01.04-2200005906). The study's first author, Yavuz GÖKÇE, generated it from her master's thesis.

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