p-ISSN 2355-5343
e-ISSN 2502-4795
http://ejournal.upi.edu/index.php/mimbar

Article Received: 02/03/2021; Accepted: 22/07/2021
Mimbar Sekolah Dasar, Vol. 8(2), 114-132
DOI: 10.53400/mimbar-sd.v8i2.32474

Teachers' and Gifted Students' Views Regarding the Implementation of the DSC in the COVID-19 Distance Education Process

Özge Ceylan✉[1] & Ünsal Umdu Topsakal[2]

[1,2] Departments of Mathematics and Science Education, Yıldız Technical University, Istanbul, Turkey

✉ ozgeceylan86@gmail.com

Abstract. Teachers and students had to use distance education environments due to the COVID-19 pandemic that suddenly emerged globally. This research aims at obtaining the views of gifted students who took the differentiated science curriculum (DSC) and teachers who conducted the DSC on the distance education process. The research was designed as a case study. Twelve seventh-grade gifted students (aged 11-12), a researcher teacher, and an observer teacher participated in the research. Student diaries, teacher diaries, and online focus group interviews were used to collect data, which were then analyzed with thematic analysis. It was observed that the students had parallel expectations and goals to the DSC at the beginning of the process. Moreover, they had positive and negative views on the distance education process. The students stated that they achieved their DSC goals at the end of the process and generally had positive experiences. On the other hand, the teachers drew attention to the problems arising from the educational environment, students, and curriculum in the distance education process. These problems were like communication, technical issues, lack of motivation, and timing. At the end of the process, the teachers suggested solutions to the problems.

Keywords: Gifted students, differentiated curriculum, distance education, science education, COVID-19

How to Cite: CEYLAN, Ö., & UMDU TOPSAKAL, Ü. (2021). Teachers' and Gifted Students' Views Regarding the Implementation of the DSC in the COVID-19 Distance Education Process. *Mimbar Sekolah Dasar, 8*(2), 114-132. doi:https://doi.org/10.53400/mimbar-sd.v8i2.32474.

INTRODUCTION ~ Due to the global impact of the COVID-19 pandemic, many countries must take a break from face-to-face education at the first stage. In August 2020, the United Nations (2020) states in the COVID-19 policy brief that at least 94% of students worldwide were affected by school cuts. Educational institutions have also decided to switch to distance education in order to control the pandemic in this process. As a result, teachers have to change their teaching environment and strategies with radical decisions. Meanwhile, students also are required to adapt to the distance education process with a rapid transition.

The main goal of distance education is to fill the shortcomings of the education provided in the classroom and provide a more effective learning environment for students (Eastman & Swift, 2001). According to Moore and Kearsley (2012), the teachers and the students are in different environments. Sometimes, it is a planned method in which the subject is presented to students offline or online and communication is provided in various ways. Although the disruption in general education during the COVID-19 pandemic has forced teachers worldwide to use distance education environments, teachers have used various distance education tools in the past. For example, teachers in first-generation used letters for distance education, while in fifth-

generation, they use the internet/web tool (Moore & Kearsley, 2012). Thus, the teachers try to integrate the recent (latest) technology into education methods. During this integration, some positive and negative results have been observed in various periods and countries.

As with all education methods, distance education has many advantages and disadvantages for students and teachers. For example, a teacher can train a limited number of students and sometimes thousands of students thanks to distance education. The benefits of distance education include its role in changing the cost and quality of education; not forcing learners to learn in the physical classroom environment; being flexible and available at any time; enabling students and teachers to use technology effectively; participating in developing computer research and writing skills (Valentine, 2002; Bates, 2005; Hurt, 2008; Chetwynd & Dobbyn, 2011; Nagrale, 2013; Brown, 2017; de Olivera et al., 2018; Sadeghi, 2019). The disadvantages include communication barriers, not asking the teacher momently, technical issues such as audio and video, sometimes complicating group work, hindering socialization, and the students not being ready (Cowan, 1995; Hurt, 2008; Brown, 2017; de Olivera et al., 2018; Sadeghi, 2019; Lall & Singh, 2020; Arora & Srinivasan, 2020; Hebebci et al., 2020). In addition, Ak et al. (2018) found negative results such as shorter follow-up times and low success in exams for students who take synchronous online courses than students who receive formal education. In another study, some science teachers stated that applying techniques requiring an implementation, such as STEM, with distance education is time-consuming and challenging to coordinate and execute (Ozdemir, 2021). Burke and Dempsey (2020) stated that teachers working in Ireland did not have distance education skills during the COVID-19 process, and they experienced problems with hardware, software, and technological skills. Therefore, increasing the skills and motivation of teachers to use online environments will positively affect students' thoughts on distance education (Machado, 2007). In addition, both international organizations, governments, and local level education administrators should provide teachers with the infrastructure they need. For example, UNICEF has established the "Learning Passport" distance education platform to support ministries of education and science in different countries to sustain student participation and help parents and teachers access distance education resources during quarantine (Miks & McIlwaine, 2020).

In Turkey, many precautions are taken for all students in this process. This includes special education students. The gifted students, which are the study group of this research, are educated in special education in Turkey. They take additional classes to develop their skills in schools called science and arts centers (SAC). Since these schools are also affected during the COVID-19 process, SAC teachers and administrators apply various distance education methods. As a result of the literature research, it has been observed that the use of asynchronous and synchronous distance education environments in gifted students has a long history. For example, the Center for Talented Youth (CTY) at John Hopkins University has a distance education program and the school curriculum. This program aims at allowing students

to progress, accelerate and enrich in the subjects in which they are most potent (Wallace, 2005). Similarly, Duke University Talent Identification Program, Northwestern University Talent Development Center, Stanford University Education Program for Gifted Students, and Renzulli Learning System are online programs applied to gifted students. When these programs are examined, it is seen that the age range is from primary school to university period, and includes subjects such as JAVA for video games, anatomy and physiology, ancient Egyptian wonders, and literary analysis (Olszewski-Kubilius & Lee, 2008).

Distance education programs prepared for gifted students accelerate their learning, enrich or differentiate educational resources (Adams & Cross, 1999; Olszewski-Kubilius & Limburg-Weber, 2002). As e-learning and distance education become an essential part of today's educational format (Larreamendy-Joerns & Leinhardt, 2006; Tallent-Runnels et al., 2006), students can gain the ability to organize their learning. Thus, they learn in proportion to their unique skills (Adams & Cross, 1999; Threlkeld, 1991; Timpson & Jones, 1989; Washington, 1997). In addition, asynchronous and synchronous distance education requires gifted students to be independent and use an approach that organizes their education (Jung, 2001; Kearsley, 2000; Keegan, 1996; Peters, 1998). Also, it enables them to control their academic progress by becoming responsible, disciplined, and independent students (Allen & Seaman, 2007; Dabbagh & Bannan-Ritland, 2005; Moore & Kearsley, 2012). These are the features that are desired to be seen in gifted students.

Technology should create opportunities for gifted students to reach creative discoveries and deal with complex and advanced technology (Periathiruvadi & Rinn, 2012). Some points should be taken into consideration in distance education, which aims at bringing students to this level (Thomson, 2010):

• Preparing a well-organized course site and using it up to date.

• Communicating with students continuously and quickly.

• Providing students with appropriate and high-quality resources, clearly explaining the course materials, and giving accurate feedback.

• Getting to know students individually and establishing a bond with them.

• Differentiating the curriculum for students and enabling them to personalize their learning.

During and before the COVID-19 pandemic, various distance education studies have been conducted for gifted and typical development students. Türksoy and Karabulut (2020) in Turkey have demonstrated their perception of distance education of gifted students in which the students defined their education as inadequate, ineffective, and negative effects. Cildir (2020) stated that distance education applied to gifted students in mathematics lessons should be carried out to provide feedback and enable students to communicate by using asynchronous

and synchronous environments together. These findings are in line with Potts (2019) who argued that gifted students studying in virtual classrooms preferred to be in social interaction rather than being alone while working. Based on these results, it can be interpreted that while gifted students reach cognitive satisfaction with distance education, their affective needs should not be ignored.

To eliminate the disadvantages experienced in distance education and increase its benefits, it may be essential to examine the reflections on students and teachers in-depth. From this point of view, this research aims at obtaining the views of gifted students who receive DSC education and teachers who conduct the course on the distance education process. Within the limit of the literature review, there have been no studies relating to DSC applied to gifted students through distance education during the pandemic period. Therefore, the research is considered to be original. It is expected that the opinions received from students and teachers will contribute to science education and distance learning for the gifted. The research questions are as follows:

(1) What are the gifted students' expectations regarding the DSC?

(2) What are the gifted students' views about the DSC and its implementation process?

(3) What problems are faced by teachers during the DSC implementation process, and what are the suggested solutions for these problems?

METHOD

The research was designed as a case study. The case study method investigates a current phenomenon or event in its natural environment without intervention by the researcher (Creswell, 2007; Yin, 2009).

Participants

The participants of the research were gifted seventh-grade students, a practitioner teacher, and an observer teacher.

Students

The research was participated by seventh-grade (aged 11-12) secondary school students diagnosed as gifted. Five of these students were male students, and seven are female students. The participants were selected from students studying at a SAC with the convenience sampling method and based on the voluntary principle in Istanbul in the 2021-2021 academic year. They were coded as S1, S2, S3, …, S12 to ensure the confidentiality of the students participating in the research.

The Practitioner Teacher

The practitioner teacher is a science teacher and applied DSC in the learning process. The practitioner teacher is working in a SAC in Istanbul.

The Observer Teacher

The observer teacher observed the students and the teaching process of the DSC from the outside and kept a diary about the opinions.

Data Collection and Analysis

Students' diaries, teachers' diaries, and focus group discussions were used as data collection tools to find an answer and make data diversification to the research questions.

Students diaries

Students' diaries consisted of semi-structured questions prepared by the researchers. The questions were examined and finalized by a science teacher and a lecturer. Throughout the process, students wrote their diaries after each lesson. Thematic analysis, one of the qualitative analysis methods, was used to analyze the student diaries. Thematic analysis is a qualitative data analysis method used to identify themes and meaning patterns in a data set to a research question (Braun & Clarke, 2013). It was used to answer the first and second research questions.

Practitioner Teacher Diary

The practitioner teacher wrote her diary after each lesson for 14 weeks. Thematic analysis was used in the analysis of this tool to answer the third research question.

Observer Teacher Diary

The observer teacher wrote her diary after each lesson for 14 weeks. Thematic analysis is used in the analysis of this tool to answer the third research question.

Online focus group interview

After the DSC implementation was completed, a focus group meeting consisting of 15 questions and lasting 94 minutes was held with the students on 23 December 2020. Six of the twelve students were selected for in-depth information. In choosing these students, their active participation in the lesson and their volunteering were taken into consideration. It was used to answer the second research question.

Validity-Reliability Studies and Ethical Issues

The data collection tools were diversified. During the implementation process, an audio screen recording of the lessons was taken to prevent data loss. In addition, an independent observer observed the classes. While coding the data sets, two coders performed the analysis, and the consensus/disagreement formula of Miles and Huberman (1994) was used. The coder reliability was calculated as 0.91. Official permissions were obtained from the university and the Ministry

of Education before starting the research. Also, students' families were informed about the study, and the research was conducted with volunteer students.

Procedure

First of all, DSC was prepared by the researchers. The curriculum has three dimensions: content, process, and theme. The course program was initially prepared for a face-to-face education environment. However, distance education started in Turkey due to the COVID-19 outbreak. Therefore, DSC has been revised to be implemented in the distance education environment. The curriculum was evaluated by four experts and corrected based on the feedback.

In the first week, pre-tests were conducted to evaluate the students' readiness, and the first diaries were filled. Pre-tests were prepared via Google Forms and shared with students. The primary distance education tool was the Zoom program. Online synchronous lessons were held with the students for 14 weeks. The students' diaries and worksheets were shared regularly for 14 weeks on Google Classroom. The teachers' diaries were written electronically and collected by mail. WhatsApp group was established to enable students to communicate with their teachers and each other. In addition, the researchers communicated with the teacher via e-mail. Besides, different online tools (Canva, Microsoft Office, YouTube, etc.) were used in the curriculum implementation. At the end of the process, the final tests were carried out again through Google Forms. The focus group meeting was also held online via Zoom.

RESULTS

Findings of the First Research Question

To determine the students' expectations and thoughts before implementing DSC, thematic analysis was applied to the first diaries. The codes and themes are presented in Table 1.

Table 1. Pre-Implementation Findings Obtained from the Students' First Diaries

Theme	Code
Cognitive goals	Getting new knowledge (S1- S5- S9- S10- S12)
	Developing reasoning skills (S8)
	Gaining objective perspective (S8)
	Getting different perspectives (S3)
	Developing critical thinking (S3- S8)
Affective goals	Creating team awareness (S2- S4)
	To enjoy (S5- S10- S11)
	Taking responsibility in group work (S4)
	Solidarity (S2- S4)
	Sharing success or failure (S4)
Content expectations	Different activities (S6- S11)
	Practical activities (S1- S7)

Personal expectations	Being successful (S10) Creating a good infrastructure (S1)

When examining Table 1, the themes of the student expectations and goals at the beginning of the process were seen. The S3 coded student statement regarding the cognitive goals theme was as follows; "To develop my critical thinking ability and to view events from different angles." The S4 coded student statement regarding the affective goals theme was as follows; "In group work, every individual should fulfill their responsibilities completely and do their best. If a groupmate needs help and the situation is available to help, we should help him. When there is a success or failure, it must be made aware that this success or failure is the whole team." The S1 coded student expressed his/her opinion on the content and personal expectation's themes with the following statement; "I would like to see activities that give me new information and that I will use by applying this information." The findings showed that the students had many goals and were willing to learn.

Findings of the Second Research Question

The students' views on DSC implementation were collected from diaries and focus group interviews. The code, sub-themes, and themes obtained from the thematic analysis of the data are presented in Table 2.

Table 2. Students' Opinions About the DSC and Implementation Process Findings

Theme	Sub-theme	Code
Student acquisitions	Process	Establishing a problem statement (S1- S2- S3- S4- S5- S11)
		Defining the problem (S2- S4- S5- S11)
		Investigating the causes of the problems (S3- S5- S11)
		Self-assessment (S1- S2- S5)
		Going down to the details of the questions (S1- S4)
		Different perspectives on math problems (S1)
		Evaluating/grouping the evidence (S2- S11)
	Advanced content	Lupus disease (S1- S2- S3- S4- S5- S11)
		Immune system functioning (S1- S2- S4- S5- S11)
		Types of immunity (S1- S2- S4- S11)
		New cell names and tasks (S1- S4- S11)
		Immune system health (S2- S5)
		The immune system and relationship with other systems (S5- S11)
		Curiosity about the immune system (S1)
	Cognitive skill	Critical thinking (S1- S2- S3- S4- S5)
		Thinking differently (S1- S2- S3- S11)
		Systemic thinking (S1)
		Detailed thinking (S3)

	Affective skill	The development of taking responsibility (S1- S2- S3- S4- S5- S11)
		Responsibility in group work (S1- S2- S3- S4- S5- S11)
		Delivering homework on time (S2- S3- S4- S5- S11)
		Teamwork (S1- S2- S3- S4- S5- S11)
		Working regularly (S1- S3- S11)
		Participating in the lesson effectively (S1- S2- S4)
		Having the opportunity to work with different people (S3- S4)
		Increased willingness to cooperate (S2- S4)
		Having the opportunity to express your thoughts (S1- S4)
		Working efficiently (S5)
		Understanding the importance of others' ideas (S5)
		Increasing curiosity (S1)
		Increased self-confidence in doing research (S11)
		Scientific ethics (S3)
		Learning to take constructive criticism (S1)
Activities	Popular	All (S1- S3- S5)
		Immune system videos (S1- S4- S11)
		Analyzing the refrigerator system (S1- S4- S5)
		Literature scanning (S11)
		Reasoning activity (S11)
		Problem story (S3- S4)
		Meeting with the expert (S1- S3- S4)
	Unpopular	Poster work (S4)
		Meeting with the expert (S5)
	Challenging	Immune system (S3)
		System theme (S1- S2- S3)
	Suggestions	More detailed clues should be given in the problem scenario (S1- S4- S5)
		There should be a dialysis center visit (S3- S4)
		Organ transplantation should be discussed in more detail (S11)
		The problem story may result differently (S3)
Process	Challenges	The intensity in the personal program (S1- S2- S3- S4- S11)
		The continuous change of lesson times and overlapping with this lesson (S5- S11)
		Less interaction due to distance education (S1- S11)
		Technical problems (sound / image / internet) (S1- S2)
		Learning a new online design program (S4)
		Preparing a presentation with group work (S11)

	Facilities	Getting the opportunity to participate in the study through distance education (S1- S2- S4- S11) The program is suitable for distance education (S1- S4) Being able to eat in class (S11) Providing the opportunity to work individually (S3)
	Suggestions	A higher-quality platform can be used instead of Zoom (S1) Homework may be less (S3)
General	The teacher	The convenience of getting to know the teacher beforehand (S2- S3- S4- S5- S11) Willingness to work together again (S1-S2-S3-S11) Good communication (S1- S2- S3- S4- S5- S11) Transferring knowledge well (S1- S2- S3- S4) As it should be (S1- S2)
	The course	The content learned for the first time (S1- S2- S3- S4- S5- S11) Good experience (S1- S2- S3- S4) A different experience (S1- S2- S3- S4- S11) Fun (S1- S3- S4- S5- S11) Want to participate in a similar process again (S1- S2- S3- S11)

Table 2 shows the students' opinions about the DSC and its implementation process. As a result of the analysis, four main themes were obtained, namely student acquisitions, activities, process, and general.

The student acquisition theme refers to students' knowledge and skills in different areas throughout the process. The process sub-theme refers to the process dimension of DSC; the S2 coded student said the following statement; "My teacher, we defined Ela's problems, we wrote them as a problem statement. Then, we gathered the clues you gave and evaluated them, and made a decision. If I am to evaluate myself, these features of mine have improved a lot in this course." With this statement, the student both evaluated himself/herself and mentioned the problem-solving steps. The advanced content sub-theme refers to the content dimension of DSC, the S11 coded student said the following statement; "Teacher, I learned a lot of knowledge. I knew nothing about lupus and the immune system. I learned it from scratch. (Teacher: What did you learn?) Well, I learned the functioning of the immune system. I learned about natural immunity and artificial immunity. I learned B and T cells, mast cells. I learned the effect of the immune system on other systems. I used to think that when people get sick, the immune system emerges, but we have always been there and working". As an example of the cognitive skill sub-theme, the S3 coded student said, "My critical thinking skills have improved. I do not know how to express it, but I think I look at everything in a different and detailed way." The S5 coded student said the following as an example of the effective skill sub-theme; "I tried to submit my homework on time, I fulfilled my responsibilities, and I think this feature has

improved. We have also fulfilled our responsibilities in group work. I found that teamwork is more efficient. I saw how important the opinions of others are."

The activities' theme expresses the students' views about the activities applied in the process. Regarding the popular and unpopular sub-theme, the opinion of the S4 coded student was as follows; "I liked the videos we watched on the immune system, I watched it again and again after the lesson. I liked it. The problem-solving was generally funny. I also liked talking with the expert, I learned a lot. But I did not like to design posters with Canva for organ donation because I learned to use it for the first time." Regarding the challenging sub-theme, the statement of the S3 coded student was: "I challenged when I learn the system theme. The immune system was also complex, but the system theme was more difficult." The S11 coded student made some suggestions: "My teacher, I think we should have learned more knowledge about kidney transplantation. It was a bit superficial. Some questions remained in my mind."

The process theme expressed the students' views on DSC implementation. The S1 coded student made the statement about the challenges, facilities, and suggestions sub-themes; "My interaction with my friends was not healthy because of distance education. Either their voices are gone or their images. So, it wasn't perfect. I think a more effective platform should be used instead of Zoom. But on the other hand, I was able to participate in this course thanks to distance education because usually, I am very busy. I have a lot of homework every day. If it was a face-to-face course, I could not participate. This course is also suitable for distance education as it is aimed at talking constantly."

The general thought theme expressed the students' views towards the teacher and the course. The S2 coded student expressed his opinions about the teacher and the course sub-theme as follows; "We have been with you already from the fourth grade. The reason I attended this lesson was that I knew you, which made it easier. Your communication was good; you conveyed the knowledge well. So, everything was as it should be. I come to such a lesson again. But let the subject be different. (Teacher: What about it?) My teacher, for example, electrical things, force, and motion, robotic things can be like that".

Findings of the Third Research Question

The thematic analysis of practitioner and observer teacher diaries was conducted to answer the third research question. The problems faced by teachers were grouped under three themes: educational environment, students, and DSC.

The educational environment theme consists of three codes: distance education, technical issues, and communication. Regarding the distance education code, the practitioner teacher stated, "we had to do our work in a distance education environment due to the pandemic. I observed that the motivation of the students was a little low for this reason. In our preliminary speech, they said they missed the school and their friends." Related to the technical issues

code, the observer teacher stated, "today, a few students did not hear their voice, they entered and exited several times, the group work was a bit disrupted. Distance education can interfere with the time planning of the lesson, and unexpected problems may arise." Meanwhile, regarding the communication code, the practitioner teacher stated, "I think that distance education reduces the communication and socialization of students, even if it is a camera or sound. It gets tough for my students who have problems with peer communication."

The student theme consists of four codes: lack of motivation, timing, lack of knowledge, and technical issues. In the lack of motivation code, the practitioner teacher stated that "Today, the S1 coded student said he was tired because he was too busy and wanted to withdraw from the lesson. I persuaded him to stay too, but it was difficult. The motivation of the children is very lacking. They cannot go out and play games, and knowledge is constantly being uploaded to them." The timing code referred to students' school schedule problems. The observer teacher stated, "Today, three of the students said they withdrew from the study because their schedules did not match." In the lack of knowledge code, the practitioner teacher said, "It was difficult to teach students the concepts of system theme.", and "I asked them to use the Canva program for the organ donation campaign poster work. While the students who knew the program participated more actively, the new learners had a little difficulty." In the technical issues code, the practitioner teacher stated, "The S2 coded student connected to the lesson from his/her mobile phone, and this situation prevented his/her from participating in today's activity. I think this problem will be experienced in practical activities from now on because his/her computer is broken."

The DSC theme consists of general code. This theme refers to the general issues of DSC. The observer teacher stated that "Today, children solved the tests and started the lesson. I think the number of tests administered was too many and they got a little bored. It took too long." And the practitioner teacher stated that "The problem clues I gave to the children could have been more. I think the clues to find a solution were messy and they could not gather them."

The practitioner and the observer teachers made some suggestions for their problems. These suggestions were gathered under three themes: educational environment, student, and DSC. The suggestions of the practitioner teacher in the educational environment theme were that; "there should be an online and free measurement and evaluation application that we can use in distance education. This deficiency needs to be eliminated by preparing different applications by the ministry." and "This process has taught us that we need to be prepared for these situations in the future. For this reason, it is necessary to work on distance education online applications. In addition, teachers need in-service training on distance education." The suggestions of the practitioner teacher in the student theme were that; "there were always uncertain conditions for the students. Schools should apply for the standard timetable and give

a break for students to rest." The suggestions of the observer teacher in the DSC theme were that; "The number of tests applied to collect data could be reduced."

DISCUSSION

Although distance education environments are suitable for many gifted students (Thomson, 2010), it is also an important opportunity for students who do not have the chance to receive education in accordance with their needs in formal education (Olszewski-Kubilius & Lee, 2004; Ravaglia et al., 1995). While preparing such environments, points such as being suitable for the characteristics of the student, allowing progress at an individual pace, being well organized, continuous communication, giving feedback should be taken into consideration. Since education should be a self-renewing and critical process, it is crucial to evaluate and reorganize the applied program. This research aims at obtaining the opinions of gifted students and teachers about the DSC used in the COVID-19 distance education environment.

From this point of view, the first question of the research was about the expectations of the students for the DSC education they will attend. It was determined that the students had cognitive and affective goals before the course. The students mentioned the goals parallel to the general objectives of the curriculum. Some studies (Artino & Ioannou, 2008; Cavanaugh, 2007; DiPietro et al., 2008) emphasized that the education format, program expectations, and application instructions should be clear for students to realize their learning and gain autonomy. In general, it was revealed that the expectations and goals of the students were in line with the program's goals. In other words, the better the students' level of course readiness and attitude, the greater the gains achieved at the end of the process.

At the end of the implementation, the data was obtained from the focus group meeting with the students about the acquisitions, activities, and thoughts regarding the process. Considering the general goals of the program, it was concluded that these goals were achieved from the expressions of gifted students. Moreover, it was found that the students liked the activities but had difficulties while learning some subjects. However, the gifted students needed to come across content that challenges them (Taber, 2010; Assouline & Lupkowski-Shoplik, 2003; Bailin, 2002; Tomlinson et al., 2002). Therefore, it is a normal and desired situation for them to express their difficulties; otherwise, they may get bored with the lesson and decrease their motivation.

The research has been conducted in a remote online education environment due to the COVID-19 outbreak. It was concluded that the students also had positive and negative expressions about this situation. Pınar and Dönel Akgül (2020) revealed that students with normal development have similar positive and negative opinions about the distance education science course. In this research, the students stated that the distance education environment made communication difficult, created technical problems such as sound and visual, and sometimes made group work difficult. In studies conducted with various age groups (Lall & Singh, 2020; Arora & Srinivasan, 2020; Hebebci et al., 2020), the results supporting these

negative expressions of students were encountered. Potts (2019) stated that virtual classrooms reveal the lack of socialization of students. Gifted students said that one of the most important positive aspects of distance education is participating in this research. Supporting students' statements, Jacobs (2017) stated that distant education environments create essential opportunities for students who have insufficient factors such as location, economy, time, and flexible working. In general, the distance education process has positive and negative consequences for everyone. In addition, many studies have positive and negative features of distance education (Brown, 2017; de Olivera et al., 2018; Sadeghi, 2019). The students also made positive statements about the practitioner teacher. They said that they would participate in such a study if they work together. Moreover, the process became more accessible because they had known the teacher for years and communicated well. It can be said that this situation may affect students' motivation and participation in the course throughout the process.

The practitioner teacher encountered several issues from the beginning of the process to the end and tried to solve these problems or suggest a solution in the process. Although the problems arising from the educational environment are gathered under different themes, it has been concluded that the common point is distance education. In Ozdemir's (2021) study, the teachers stated that distance education practices have disadvantages such as time management, lack of participation in the lessons, and isolation of students. Burke and Dempsey (2020) stated that teachers experienced technical problems in the distance education process. On the other hand, Bakioğlu and Çevik (2020) noted that this process positively affected teachers' use of technology. In other words, while the teachers were trying to solve their problems, they developed another feature.

The problems arising from the students were the lack of motivation, incompatibility of the curriculum, lack of knowledge, and technical problems. According to their expressions, gifted students were exposed to intense programs in distance education, and this situation exhausted them. This can be seen as the source of their decline in motivation.

CONCLUSION

Under the impact of an outbreak of COVID-19, distance education was introduced all over the world, including in Turkey at that time. For this reason, the research, which was designed primarily for a face-to-face education environment, was then conducted over a face-to-face program in a distance education environment with various changes. Converting the research to online education later may be one of the limitations of the research. In addition, the research was conducted with only twelve gifted students. The small sample size was one of the limitations of the research. Since distance education makes it possible to reach more students, it may be suggested that the following research be conducted with a larger sample size. This research focused on only one unit. In the following research, modules with different contents can be

developed, and students' and teachers' ideas can be obtained. Thus, alternatives to the education programs needed for gifted students will be produced.

ACKNOWLEDGMENTS

This study was adapted from the first author, Özge Ceylan, doctoral thesis titled "Access, Critical Thinking Skills and Values of Gifted Students Through Differentiated Science Program: An Action Research."

REFERENCES

Adams, C. M., &. Cross, T. L. (1999). Distance learning opportunities for academically gifted students. *Journal of Secondary Gifted Education*, 11, 88-96. DOI: 10.4219/jsge-1999-618

Ak, A., Oral, B., & Topuz, V. (2018). Evaluation of distance learning process of Marmara University Vocational School of Technical Sciences. *Science, Education, Art and Technology Journal*, 2(1), 71-80.

Allen, I. E., & Seaman, J. (2007). *Online nation: Five years of growth in online learning*. Newburyport.

Arora, A. K., & Srinivasan, R. (2020). Impact of pandemic COVID-19 on the teaching–learning process: A Study of Higher Education Teachers. *Prabandhan: Indian Journal of Management*, 13(4), 43-56. DOI: 10.17010/pijom/2020/v13i4/151825

Artino, A., & Ioannou, A. (2008). Promoting academic motivation and self-regulation: practical guidelines for online instructors. In K. McFerrin, R. Weber, R. Carlsen & D. Willis (Eds.), *Proceedings of SITE 2008--Society for Information Technology & Teacher Education International Conference* (pp. 208-212). Las Vegas, Nevada, USA: Association for the Advancement of Computing in Education (AACE).

Assouline, S. G., & Lupkowski-Shoplik, A. (2003). *Developing mathematical talent: A guide for challenging and educating gifted students*. Prufrock Press.

Bailin, S. (2002). Critical thinking and science education. *Science & Education,* 11, 361–375. DOI: 10.1023/A:1016042608621

Bakioğlu, B., & Çevik, M. (2020). Science teachers' views on distance education in the COVID-19 pandemic process. *Turkish Studies*, 15(4), 109-129.

Bates, A. T. (2005). *Technology, e-learning and distance education*. Routledge.

Braun, V., & Clarke, V. (2013). *Successful qualitative research: A practical guide for beginners*. Sage.

Brown, C. (2017). *Advantages and disadvantages of distance learning*. https://www.eztalks.com/elearning/advantages-and-disadvantages-of-distance-learning.html.

Burke, J., & Dempsey, M. (2020). *Covid-19 practice in primary schools in Ireland report*. Maynooth University, Ireland.

Cavanaugh, C. (2007). Effectiveness of K–12 online learning. In M. Moore (Ed.), *Handbook of distance education* (2nd ed.). Lawrence Erlbaum.

Chetwynd, F., & Dobbyn, C. (2011). Assessment, feedback and marking guides in distance education. *Open Learning: The Journal of Open, Distance and e-Learning*, 26:1, 67-78. DOI: 10.1080/02680513.2011.538565

Cildir, M. (2020). About distance mathematics education of gifted students studying at secondary school. In S. Idin (Ed.), *Research highlights in education and science 2020,* (pp. 142- 152). ISRES Publishing.

Cowan, J. (1995). The advantages and disadvantages of distance education. In R. Howard & I. McGrath (Eds.), *Distance education for language teachers: A UK perspective* (pp. 14-21). UK: Multilingual Matters.

Creswell, J. W. (2007). *Research design: Qualitative, quantitative, and mixed methods approaches* (2nd ed.). Sage.

Dabbagh, N., & Bannan-Ritland, B. (2005). *Online learning: Concepts, strategies, and application*. Pearson Education.

de Oliveira, M. M. S., Penedo, A. S. T., & Pereira, V. S. (2018). Distance education: advantages and disadvantages of the point of view of education and society. *Dialogia*, (29), 139-152. DOI: 10.5585/dialogia.N29.7661

DiPietro, M., Ferdig, R. E., Black, E. W., & Preston, M. (2008). Best practices in teaching K–12 online: Lessons learned from Michigan Virtual School teachers. *Journal of Interactive Online Learning*, 7, 10–35.

Eastman, J. K., & Swift, C. O. (2001). New horizons in distance education: The online learner-centered marketing class. *Journal of Marketing Education*, 23(1), 25-34. DOI: 10.1177/0273475301231004

Hebebci, M. T., Bertiz, Y., & Alan, S. (2020). Investigation of views of students and teachers on distance education practices during the Coronavirus (COVID-19) Pandemic. *International Journal of Technology in Education and Science*, *4*(4), 267-282.

Hurt, J. (2008). The advantages and disadvantages of teaching and learning online. *Delta Kappa Gamma Bulletin*, *74*(4), 5-11.

Jacobs, J. K. (2017). Providing programs and services for gifted students at the secondary level. In Eckert, R. D., & Robins, J. H. (Eds). *Designing services and programs for high-ability learners: A guidebook for gifted education* (2nd ed., pp. 122-153). Corwin Press.

Jung, I. (2001). Building a theoretical framework of web-based instruction in the context of distance education. *British Journal of Educational Technology*, 32, 525 – 534. DOI: 10.1111/1467-8535.00222

Kearsley, G. (2000). *Online education: learning and teaching in cyberspace*. Wadsworth.

Keegan, D. (1996). *Foundations of distance education* (3rd ed.). Routledge.

Lall, S., & Singh, N. (2020). COVID-19: Unmasking the new face of education. *International Journal of Research in Pharmaceutical Sciences*, 11(SPL1), 48-53. DOI: 10.26452/ijrps.v11iSPL1.2122

Larreamendy-Joerns, J., & Leinhardt, G. (2006). Going the distance with online education. *Review of Educational Research*, 76, 567–605. DOI: 10.3102/00346543076004567

Machado, C. (2007). Developing an e-readiness model for higher education institutions: Results of a focus group study. *British Journal of Educational Technology*, 38(1), ss. 72- 82. DOI: 10.1111/j.1467-8535.2006.00595.x

Miks, J., & McIlwaine, J. (2020). *Keeping the world's children learning through COVID-19*. https://www.unicef.org/coronavirus/keeping-worlds-children-learning-through-covid-19.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Sage.

Moore, M. G., & Kearsley, I. G. (2012). *Distance education: A systems view of online learning* (3rd ed.). Wadsworth Publishing.

Nagrale, P. (2013). *Advantages and disadvantages of distance education*. https://surejob.in/advantages-and-disadvantages-of-distance-education.html.

Olszewski-Kubilius, P., & Lee, S. (2008). Specialized programs serving the gifted. In F. A. Karnes (Ed.), *Achieving excellence: Educating the gifted and talented* (pp. 192–205). Pearson Education.

Olszewski-Kubilius, P., & Limburg-Weber, 1. (2002). *Designs for excellence: A guide to educational program options for academically talented middle and secondary*

school students. Evanston, IL: Northwestern University, The Center for Talent Development.

Ozdemir, E. B. (2021). Views of Science teachers about online STEM practices during the COVID-19 period. *International Journal of Curriculum and Instruction*, *13*(1), 854-869.

Peters, O. (1998). *Learning and teaching in distance education: Analyses and interpretations from an international perspective*. Kogan Page.

Periathiruvadi, S., & Rinn, A. N. (2012). Technology in gifted education: A review of best practices and empirical research. *Journal of Research on Technology in Education*, *45*(2), 153-169. DOI: 10.1080/15391523.2012.10782601

Pınar, M. A., & Dönel Akgül, G. (2020). The opinions of secondary school students about giving science courses with distance education during the Covid-19 Pandemic. *Journal of Current Researches on Social Sciences*, 10 (2), 461-486.

Potts, J. A. (2019). Profoundly gifted students' perceptions of virtual classrooms. *Gifted Child Quarterly*, *63*(1), 58–80. DOI: 10.1177/0016986218801075

Ravaglia, R., Suppes, P., Stillinger, C., & Alper, T. M. (1995). Computer-based mathematics and physics for gifted students. *Gifted Child Quarterly*, 39, 7–13. DOI: 10.1177/001698629503900102

Sadeghi M. A. (2019). Shift from Classroom to Distance Learning: Advantages and Limitations. *International Journal of Research in English Education*, 4 (1), 80-88. DOI: 10.29252/ijree.4.1.80

Taber, K. S. (2010). Challenging gifted learners: General principles for science educators; and exemplification in the context of teaching chemistry. *Science Education International*, *21*(1), 5-30.

Tallent-Runnels, M. K., Thomas, J. A., Lan, W. Y., Cooper, S., Ahern, T. C., Shaw, S. M., & Liu, X. (2006). Teaching courses online: A review of the research. *Review of Educational Research*, 76, 93–135. DOI: 10.3102/00346543076001093

Thomson, D. L. (2010). Beyond the classroom walls: teachers' and students' perspectives on how online learning can meet the needs of gifted students. *Journal of Advanced Academics*, *21*(4), 662–712. DOI: 10.1177/1932202X1002100405

Threlkeld, R. (1991). Increasing educational options through distance learning. *Communicator*, 21(1), 12-14.

Timpson, W. M., & Jones, C. S. (1989). Increased education choices for the gifted: Distance learning via technology. *Gifted Child Today*, 12(5), 10-11. DOI: 10.1177/107621758901200505

Tomlinson, C. A., Kaplan, S. N., Renzulli, J. S., Leppien, J., Burns, D., & Purcell, J. (2002). *The parallel curriculum: A design to develop high potential and challenge high ability learners*. Corwin Press.

Türksoy, E., & Karabulut, R. (2020). Gifted students' perceptions of distance education in the Covid-19 epidemy. *Talent, 10*(2), 176-189. DOI: 10.46893/talent.773442

United Nations (2020). *Policy Brief: Education during COVID-19 and beyond*. https://www.un.org/development/desa/dspd/wp-content/uploads/sites/22/2020/08/sg_policy_brief_covid 19_and_education_august_2020.pdf.

Valentine, D. (2002). Distance learning: Promises, problems, and possibilities. *Online Journal of Distance Learning Administration*, 5(3), 1–11.

Wallace, P. (2005). Distance education for gifted students: Leveraging technology to expand academic options. *High Ability Studies*, 16, 77-86. DOI: 10.1080/13598130500115288

Washington, M. F. (1997). Real hope for the gifted. *Gifted Child Today*, 20(6), 20-22. DOI: 10.1177/107621759702000607

Yin, R. K. (2009). *Case study research: Design and methods* (4th ed.). Sage.