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# What Has Changed in Teaching Environments After Distance Education? Student and Teacher Opinions

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## Abstract

The effects of the changes experienced with the Covid-19 pandemic on the education-teaching process have been the subject of many studies. It is seen that researches generally focus on distance education. On the other hand, with the decrease of the effect of the pandemic, face-to-face education started. In this process, teachers are expected to transfer their distance education experiences to face-to-face education environments. In this study, the effects of distance education on face-to-face education environment were investigated. Within the scope of the qualitative case study, the opinions of students and teachers who shared the same teaching environment during face-to-face education before distance education, face-to-face education after distance education and distance education were taken. The study group consists of twelve students who study in a high school affiliated to the Ministry of National Education in Türkiye/Ordu and are selected on a voluntary basis, in accordance with the purposeful sampling qualifications, and the teachers who attend the classes of these students. From the analysis of the interview data, findings such as the opinions of students and teachers about the face-to-face education environment, in-class communication, and materials used in teaching environments were obtained. It was concluded that the content used by the teachers on the smart board became richer after the distance education. However, it was determined that the teachers did not use a new application in the process. It has been determined that some students have different expectations about education life as a result of their distance education experiences.

**Keywords:** Distance Education, Face-To-Face Education, Teaching Environment

## 1. Introduction

Distance education (DE) is defined as the physical absence of the learner and the learning resource (Carswell & Venkatesh, 2002). DE, which was enforced due to the Covid-19 pandemic, has become a new teaching environment for many teachers and students. This process has allowed teachers and students to experience new and different experiences.

Looking at the history of DE in Türkiye, it can be said that it started to be discussed as a concept in 1923. DE, which experienced change and development with various approaches in the process, was applied systematically in the 1980s and 1990s. Since the end of the 1990s, information and communication technologies have been included

in the DE system. Today, DE can be run synchronously and asynchronously over the internet (Kırık, 2014; Bozkurt, 2017).

When we look at the studies in the field of DE, it is seen that there are mostly studies with university students. In these studies, university students' views, perceptions and attitudes towards DE were investigated. Along with these, there are studies on learning on DE. When we look at the studies on DE with secondary school, high school students and teachers, it is seen that it intensifies in 2020 and 2021. It can be said that the studies on DE at the secondary and high school level were mostly carried out after the pandemic.

Tuncer and Bahadır (2017) concluded in their study that about half of the students could not learn with DE. In a study in which students' opinions on DE were taken, it was revealed that nearly half of the participants thought that achieving course achievements in DE depended on the infrastructure and effort of the student (Öztaş & Kılıç, 2017).

Many studies have revealed the advantages and disadvantages of DE. In the study of Sadeghi (2019), the advantages are stated as the absence of space and time constraints, saving time and money, and flexibility in choosing courses. In the literature, it has been presented as an advantage that the student can repeat unlimited lessons whenever he wants, ease in accessing the materials, and providing a flexible and comfortable environment without teacher pressure (Paydar & Doğan, 2019; İmamoğlu & İmamoğlu, 2020; Arık et al., 2021). Disadvantages are expressed as distraction, technological deficiencies or malfunctions, poor social interaction and communication (Sadeghi, 2019). In some studies, negative opinions of students about DE were reported. These can be summarized as hardware or internet connection problems, not being motivated to the lesson, being used to rote and laziness, failure due to weakening of their duties and responsibilities, insincere learning environment, indifference and insincerity of the lecturers. In these studies, it has been reported that some students prefer face-to-face learning to DE (Birişçi, 2013; Tuncer & Bahadır, 2017; Bali & Liu, 2018; Karatepe, Küçükgençay & Peker, 2020). With its advantages and disadvantages, DE offers teaching environments independent of time and space, with flexible conditions. DE has emerged as an alternative method for those who have difficulty in accessing education opportunities due to various reasons in the past. Within the time, printed materials, television and radio channels etc. have been used to reach the students in DE processes. Communication channels established with students at DE have changed depending on the developments in technology. Today, DE can be given over digital media thanks to internet access. The opportunities offered by digital environments contribute to the enrichment of teaching environments.

Giving lessons remotely during the pandemic process has forced all teachers to use digital environments. It is thought that this obligation increases teachers' dominance in digital environments. Teachers used teaching technologies that they did not use before during the pandemic process. It is thought that these experiences of the teachers will cause a difference between the face-to-face education (FFE) before DE and the FFE environments after DE.

After the Covid-19 pandemic was declared in Türkiye, a new process has started for students who received FFE in the whole of the 9th grade and in the fall semester of the 10th grade. These students took DE in the 10th grade spring semester and in the entire 11th grade, and they took FFE in the 12th grade. In summary, these students took all their courses face-to-face at the beginning of high school, then distance, then face-to-face again. This process is a new situation that is rarely seen in our education history. Addressing and examining this situation is necessary for the development of our education system. In this study; "What are the effects of DE given in the pandemic on the FFE process?"; "What are the differences between the pre-DE FFE and post-DE FFE environments?" answers to the questions were sought.

## 2. Method

Qualitative case study investigates the phenomenon in its context integrating and in-depth to gain a better understanding of an application or topic. It summarizes the limited system studied in accordance with its nature. In this way, it supports and facilitates informed decision making (Patton, 2002; McMillan & Schumacher, 2001).

DE is a dedicated workspace. When the studies on DE are examined, it is seen that research is generally done in a limited time and mostly in the context of a course. DE implemented with the pandemic is mandatory in most countries and covers all components of the system. The results of DE given in this way and its effects on teaching environments are a special case that needs to be investigated. In order to examine this special case, our research was conducted as a qualitative case study.

### *2.1 Participant Characteristics*

A single case or small sample does not allow for generalization but opens up new areas for further research. However, thanks to purposive sampling, deep and rich information about the particular situation can be accessed (Patton, 2002). The ones who will best describe the effects of DE in the pandemic on the next FFE process are the teachers and students who experience this process together. In this context, the student qualifications in the purposive sample are to have received an FFE in the 9th grade and the fall term of the 10th grade in a public school in Türkiye, to have received DE in the spring semester of the 10th grade and in the entire 11th grade, and then to have received an FFE in the 12th grade. The purpose of teacher qualifications is to have attended the classes of the students in the sample during all these processes.

### *2.2 Sampling Procedures*

In the DE process, the course was taught through technological devices. Teachers can transfer these experiences to FFE through smart boards. According to the statistics of the Ministry of National Education (MEB), the most students in secondary education institutions in Türkiye are in General Secondary Education institutions (MEB, 2021). For this reason, in order to reach the study group, those with smart boards in their classrooms were identified from the General Secondary Education institutions in Ordu. The researcher went to these institutions and made preliminary interviews with the school administrators. The Ministry of National Education requests a School/Institution Approval Letter from the school administration for the research permit. A School/Institution Approval Letter was received from the school administration, which accepted the conduct of this research in their schools. The school is an Imam Hatip High School designated as a project school. It is an institution that accepts students with points within the scope of the High School Transition System (LGS). Most classrooms in the school have smart boards and internet connection. At the same time, there is a computer laboratory in the school where the devices are new and in working condition. The study group was determined on a voluntary basis in this school.

#### *2.2.1 Sample Size*

The participants consisted of twelve students, six girls and six boys, and four teachers, studying in the 12th grade, who had the qualifications of purposeful sampling. Since the students mainly take courses in mathematics, physics, chemistry and biology, the teachers of these courses were chosen for the study group. During the DE process, the working group taught all the lessons live in an online environment where the cameras were turned off and only the sounds were turned on demand.

### *2.3 Data Collection Tools and Procedure*

Qualitative data were collected through the semi-structured Student Interview Form and Teacher Interview Form. The Student Interview Form consists of thirteen open-ended questions, and the Teacher Interview Form consists of nine open-ended questions. In order to investigate the change experienced in teaching environments after DE, it is necessary to define teaching environments before and after DE. For this reason, the first questions in the data collection tools were created for the DE process and previous FFE environments. The last questions of the tools were created to identify the post-DE teaching environments and to reveal the data that will enable them to compare with the previous processes. Data collection tools were developed by the researcher. Necessary corrections were made in the forms examined by two field experts and a Turkish language expert. The re-examined forms were applied after receiving feedback that they were ready to apply.

Parent Consent Form was signed by the parents of the students in the study group and the Participation Acceptance Form was signed by the teachers in order to confirm voluntary participation in our research and to allow the recording of the interviews. Focus group discussions were held with students and teachers. A focus group interview is an interview with a purposeful sample group that has had similar experiences. In this way, more qualified and richer data can be collected than interviews with a single person (McMillan & Schumacher, 2001). A total of four focus group interviews were conducted throughout the research process. Two student groups were formed to form a group of six students studying in the same class. Biology and chemistry teachers formed a group, and physics and mathematics teachers formed a group, taking into account the harmony of the teachers with free lesson hours. Each interview lasted approximately one hour. In order to protect the data and to carry out the analysis process properly, the interviews were audio recorded.

#### *2.4 Data Analysis*

The collection, organization and analysis of data in case studies represent the analysis process as a special method designed for the purpose (Patton, 2002). In our study, it can be said that the analysis process begins with the collection of data. In the data collection process, the attention paid to and the contexts established were noted by the researcher. The analysis process was carried out within the framework of the results of the literature review and the notes taken during the interviews. In order to make a good start in inductive analysis, terms and practices specific to the interviewees are defined (Patton, 2002). For this reason, the analysis started by defining the meanings given by the participants to some terms used during the interview. These definitions are presented at the beginning of the findings section. All audio recordings were transcribed and the raw data were brought together. In order to make a healthy comparison of the processes before and after the DE, the DE process was defined first. Afterwards, the FFE environment after DE was defined and compared with previous processes. Interview data of students and teachers were first analyzed among themselves. The data turned into findings were handled together and the result was reached.

#### *2.5 Validity and Reliability*

Thanks to the interaction in focus group interviews, better quality data can be collected. In addition to the emergence of various points of view, participants avoid expressing false and excessive views. This situation positively affects the validity of the interview (Krueger & Casey, 2000). In the interviews, a friendly atmosphere was created so that the participants could convey their thoughts as they were. In order to get everyone's opinion, the participants were given the right to speak in turn after each question. The researcher avoided directive expressions, gestures and attitudes while managing the chat environment. The researcher received confirmation from the participants by reading the notes he took about the answers. After the written data were analyzed, the audio recordings were listened to again and the findings were reviewed.

### **3. Results**

In this part, the findings obtained from the analysis of the data are presented in two parts as student opinions and teacher opinions. First of all, the education-teaching environments shared by the teachers and students who make up our participant group during the DE process were defined. Afterwards, the descriptions of the post-DE FFE environments were introduced.

During the interviews, students and teachers used some words or phrases such as "field lessons." It is important to know the meaning that the participants attribute to these words in order to carry out the process of transforming the data into findings and interpreting them properly. During the interview, the researcher asked the participants about the meanings they attributed to these words. Based on the answers received, the following definitions were made.

Field courses: Mathematics, physics, chemistry and biology courses for the field in which students prepare for the university entrance exam.

Science courses: Mathematics, physics, chemistry, biology.

Verbal courses: Literature, history, geography, philosophy.

Vocational courses: The Qur'an, fiqh, tafsir, akaid, etc. lessons.

### 3.1 Students' Opinions

All of the students stated that they could not attend all the courses during the DE process or they did not participate voluntarily. The students explained the reasons for not attending the classes by saying, "I couldn't wake up for the early morning classes, I was busy, I couldn't attend the class, I needed to help with some chores at home, the house was crowded, there was a connection problem when we were in the village, sometimes there was problem with the teachers' connection." Three students stated that they sometimes have internet connection problems. One of them stated that this problem existed when they went to the village. A student stated that he had a hardware problem at first, and then the problem was solved. The other eight students stated that they did not experience any hardware or connection problems.

One of the students, İrem, made a statement on the subject: "I could not attend all of them and sometimes I did not participate of my own accord. Because, again, as Büşra said, I was trying to take more time to study for myself after taking my field courses, so I did not attend all of them. I was also sleeping. It was difficult to wake up early in the morning so I didn't get a chance to attend all of them." As seen in the statement, students stated that they did not attend some classes voluntarily. They said that these courses are mostly music, visual arts, physical, verbal and vocational courses. Students mentioned that they do not prefer to take these courses because they are outside the field where they are preparing for the university exam.

Students stated that they mostly attended mathematics, physics, chemistry, biology and literature courses during the DE process. The students stated that they preferred to attend these classes because they were productive. The frequencies of the findings are presented in Figure 1.

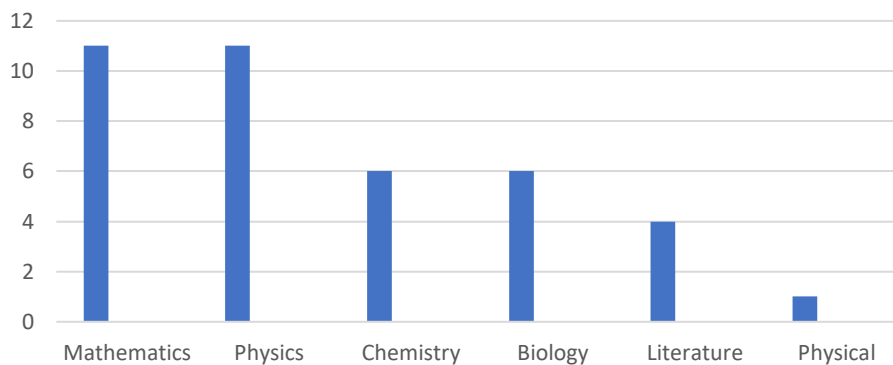


Figure 1: The courses most attended by students in the distance education process

The students said that the courses they attended the most were mathematics and physics. In these courses, the question-solving methods and techniques for the university exam are given in the courses, which is expressed as the reason for the students to attend the courses. Zehra said, "When I first started, I actually attended all of them, then courses such as literature and history started to be inefficient. I mean, like Kübra, I was also distracted, I had difficulty in understanding, but other than that, I tried to attend science courses completely because they were productive. Even if there was some difficulty, our teachers explained it very well." Eren, on the other hand, explained, "My reasons for joining were mathematics, as my friend said, method and tactics, and my teacher provided a suitable environment there. But for example, biology or chemistry, for me, they are not lessons that can be understood without looking into the eyes of the teacher. I mean, we normally hardly understand those lessons anyway. It also gets harder when you're online. Even though we joined after missing a certain part of it, we didn't understand it after there was a gap in between..."

Students who stated that they did not attend biology and chemistry classes said that they did not attend the lesson because they could not understand it online. In this regard, some students pointed out the problem in the connection

of their teachers. The students who attended the literature class stated that their teachers explained the lesson well and that they liked to listen to the lesson.

Some students detailed that they would like to receive some of their education online and some face-to-face if given the opportunity. Four students mentioned that they should be FFE throughout the learning process, and one student stated that they should be DE. Students' DE and FFE requests are presented in Table 1.

Table 1: Students' distance education and face-to-face education demands

Opinions	Students	f
Science courses should be face-to-face, verbal courses should be online.	Büşra, Hatice, Kübra, Mustafa, Yusuf	5
All lessons should be face-to-face	Zehra, Ali, Eren, Ömer	4
All lessons should be online	Faruk	1
9., 10., 11. Grades face-to-face, 12. Grade distant	Rabia	1
9 and 10. Grades face-to-face, 11 and 12. Grades distant	İrem	1

Hatice said, "I think science courses should definitely be face-to-face because it doesn't seem to be very efficient in distant education. However, even if we listen to it in distance education in terms of verbal courses, it is forgotten when it is not repeated for a while. That is, we need to work again on verbal lessons. In that respect, I think the verbal courses can be from afar." Omer said, "Online education had its pros as we got rid of things like commuting from home to school, but the cons were definitely more, the environment was not good there, there were many distractions. That's why I said face to face."

Yusuf said, "I would prefer that the important lessons are face-to-face and the rest are either not held or online." When the researcher got the answer, she posed additional questions "What do you mean by important lessons?". Yusuf gave the answer to this question, "Predominantly science courses." Students who want all or some of the courses to be online stated that they can spend more time on their own studies in this way.

The students mostly used the concepts of communication, time, social life, classroom management and motivation while expressing the differences between DE and FFE. These findings are presented collectively in Figure 2.

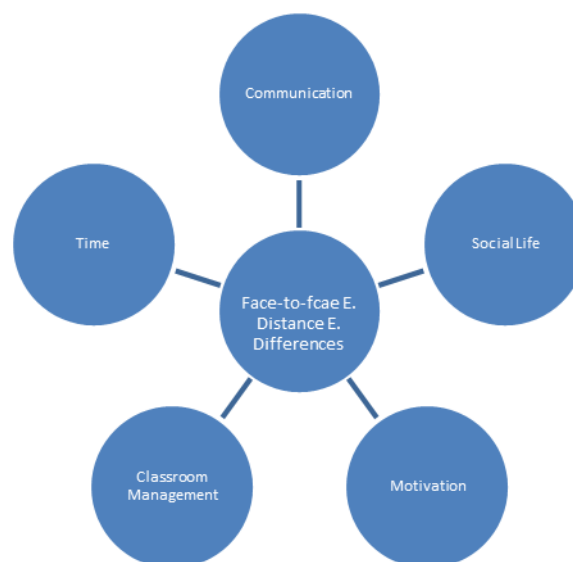


Figure 2: Differences between distance education and face-to-face education according to students

Students stated that they found DE more advantageous in terms of time. On the other hand, students stated that FFE was better in communication. Kübra expressed her opinions on communication, "There is both a time

difference in distance education and a huge difference in the communication between the teacher and the student. In distance education, for example, I did not meet with any teacher properly. Here, we do not say anything, whether we understand or not. We do not ask questions, so even if we do, we will not understand when he explains.” Students explained that in-class communication in DE was very weak, sometimes not even at all. It has been said that very few people speak in the lessons and respond to the teacher. İrem complained, “The people in the class talk when face-to-face, but I especially had a hard time in distance education. (Laughter) Sometimes I felt like I was in tuition with the teacher.” Other students stated that they did not speak because they were disturbed by the fact that their voices were mixed with each other in the online environment, their voices were interrupted and the lesson was interrupted. In the continuation of this topic, the students stated that class discussion is not possible in such an environment. A student commented, “If the class is 30 people in half an hour distance education, 1 minute per person is not enough.”

Some students explained that they had problems with focusing and motivation in DE. Ali said, “I can't explain it fully in distance education, but there seemed to be no feeling. I could not feel that classroom atmosphere, I could not get that mentality. You know, it felt like I was watching something rather than listening to a lecture. At school, it became more disciplined and more coordinated.” It has been stated that DE limits the teacher in terms of classroom management. Ömer expressed this as “...The teacher cannot control the classroom much in distance education because he cannot be sure whether they listen to or not? After a while, it is good for those who listen. Lessons are not disrupted. It goes smoothly.”

Students expressed that social life is restricted in DE, but this situation is not a great loss for them, that is, for those who are preparing for the university exam. Some students stated that the social environment in FFE encouraged them to study. On this topic, Hatice said, “... (DE) I think it had a great impact on the questions that we couldn't do differently. At least there is a friendly atmosphere in the school environment. In other words, we see that each other is working, it is a great advantage in terms of asking our friends or teachers the questions that you cannot ask. It was very important for it to be so and to understand the issues.” On the other hand, the students also mentioned that the social life would increase the contagion of epidemics in FFE. Students mentioned that they could devote more time to social life in a UE environment where there is no pandemic.

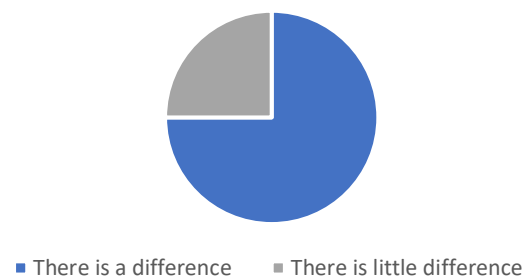


Figure 3: Comparison of Face-to-face Education Before Distance Education and Face-to-face Education After Distance Education

As seen in Figure 3, nine students stated that there was a difference between pre-DE FFE and post-DE FFE, while three students stated that there was not much difference. All students said that their teachers' use of smart boards increased in FFE environments after DE. Even teachers who never used smart boards in lessons before DE now use smart boards. İrem said, “I think the biggest difference is the materials that teachers use at school. For example, the only digital book I have observed at the moment is PDF. It was already present in some courses in face-to-face education before the pandemic, but now, for example, our teachers, who have never used it, have started to use the smart board.” The students indicated that after the DE, their teachers used applications such as textbooks on the smart board, resource books in different publications, PDF files, learning outcomes tests, videos, animations, slides and writing in FFE environments. Students reported that some of their teachers used these applications on the smart board in the processes before DE.



The researcher asked whether interactive applications such as simulation were used in FFE environments after DE. All of the students stated that they do not currently use simulation or any other interactive application in their classes.

The students identified that the Kahoot application was used only in philosophy courses in the DE process. One of the students stated that he used simulation during his personal studies in the DE process, but his teachers did not use simulation in the lessons.

It was said that many projects were carried out in their schools before DE, these projects were not continued after DE and new projects were not started. The students stated that although they switched to FFE after DE, teachers and students were worried about interrupting FFE again.

The students answered the questions asked about in-class communication and class discussion in conjunction with each other. Four of the students mentioned that there is a difference in classroom communication in the FFE after DE compared to before. While Ali expressed it "... (teachers) seem to have weakened their communication with students. The distance seems to have widened a little more", Mustafa said, "I think the chat environment has also decreased." Students Büşra and Zehra stated that after DE, in-class communication and classroom discussions decreased compared to before. Other students said that this situation is related to the continuation of the pandemic. Ömer and Kübra stated that they were in the twelfth grade as an influence on this issue, and Yusuf stated that the calmness brought about by their age. In this regard, some students specified that when the pandemic is over, teacher-student, student-student communication will be the same as before. However, Büşra, one of the students, objected to this and said that it is difficult to go back to the past.

Rabia explained that the subject of classroom communication and participation in the discussion is related to the personality of the student and his interest in the lesson in every semester, "The student who had a communication breakdown before the pandemic is having the same problem again. During the pandemic period, for example, I know İrem, she was one of our friends who participated most actively in distance education, her communication with the teachers was very good. For example, while I did not prefer to open my microphone, İrem was opening the microphone in every lesson and speaking. İrem is the same as she is, I was a person who did not attend the class much before the pandemic, I behave in the same way again." Some students stated that they were worried that their voices would go bad during the DE process or that their voices would be confused because several people were speaking at the same time. In the continuation of the speech, the students stated that having their cameras turned on during the DE process would affect the in-class communication positively. Rabia said, "I want to talk about the camera. When we first started distance education, nobody wanted to open their camera. There were reservations, including me, because we were a little hesitant. Never in a home environment. Because we are in a different environment. But if I had distance education right now and our teachers asked us to turn on our cameras, I would happily do so. Because I believe now that it will be more efficient with the camera. At that time I was hesitant, but now I can open it, there is no problem." while other students stated that they agreed with this idea with expressions such as "I agree, definitely." The researcher said, "Then, can we get something like this out of here.. Can we say that if the cameras were open during the DE process, we could have a better communication?" posed additional questions to the students. All of the students answered "Yes" to this question.

### *3.2 Teachers' Opinions*

Physics teacher Kemal DE divided the process into two parts. He defined the first part as the period of inexperience, when the pandemic had just started, and the second part as the period of gaining experience. Other teachers did not make such a distinction and definition. However, it was observed that teachers talked about the period when they gained experience rather than the first period of DE.

Teachers stated that most of the students attended their classes during the DE process. However, the teachers stated that it is not possible for all students to attend classes in such a process. However, teachers emphasized the discomfort they felt because they could not reach all their students.

Teachers stated that students who were successful in DE and interested in the course were generally good at FFE before DE. Mathematics teacher Mehmet mentioned, "Class differences in distance education, differences between children have become very clear. In other words, we have seen that good students have almost the same learning potential, whether they are from afar or not." Although there were students whose success level decreased in this period, it was emphasized that generally successful students turned DE into an advantage in terms of time. Teachers stated that successful students can learn in DE, but for students with average or low success level, it is absolutely necessary to have FFE. Kemal teacher explained the situation as "There is a student profile, a student profile trying to disrupt the class, and a student profile trying to listen to the lesson all the time. This was very good for the student profile trying to disrupt the class. They didn't join in the lesson, and when they joined they opened Zoom and left. I got the following feedback from students who want to listen to the lecture all the time. Teacher, we don't really need to come to school, we learn everything in this way. In this way, we don't waste time for commuting." Chemistry teacher Ahmet said, "At first, I was thinking if this work can be accomplished remotely. Of course it succeeds. You can teach any student who wants, learning takes place, but education is interrupted in this process. In other words, emotional development, especially in terms of socialization." Teachers stated that it is not possible to provide education in DE, only teaching can be done. On this subject, Mehmet teacher said, "Distance education is just about giving information and the education part is gone, and the teaching part is left."

All teachers emphasized that the inability to use body language, gestures and facial expressions in DE is an important deficiency. They stated that this situation had a negative effect on in-class communication. Ahmet teacher stated "... (at DE) you can't make eye contact, you don't have facial expressions. You don't know what mood the student is in at that moment. He doesn't know what mood you are in. When I raise my voice a little, when I raise my voice only to make my voice heard better, not to get angry, he may think he is angry. However, when he looks at me in the classroom environment, he can perceive that I am not angry, that I raise my voice to attract attention." In order to overcome this disadvantage of DE, the teachers suggested that the cameras should be turned on. Teacher Kemal said, "If we had a good infrastructure, it would have been more productive. I definitely think that attendance should have been taken, the cameras should have been opened."

Some teachers stated that after DE, the mask negatively affected in-class communication in FFE. Biology teacher Hasan said, "I can't even tolerate a mask. Because I really care about children's facial expressions, this is the mood of the person, it is the body language. In order to understand the mood of the child, we need to come face to face and even remove the masks." Teachers stated that classroom discussion is not possible in DE. Mathematics teacher Mehmet stated that the course is not suitable for creating a discussion environment in DE. Teacher Hasan said, "Even though the child's voice can be heard while sitting at home, he does not bring himself to the fore by thinking that his friends are not with him. Even if he wants to argue, he does not argue there. Therefore, I saw that no matter how hard we tried to continue the in-class discussions on the screen, it did not work well."

Ahmet teacher stated that they had a class discussion before DE about the class discussion in FFE after DE and said, "Right now, we missed a little more, I guess we are increasing it. Now, while the child is listening to the lesson, I try to make them argue, I try hard. Because I want them to talk, I want them to talk. We talked a lot because we were in front of the computer for eight months." Teachers pointed out that students were willing to participate in class discussions in FFE after DE. Hasan teacher mentioned that during this period, the in-class discussions were prolonged and sometimes even the subject dispersed.

Teachers stated that they missed and appreciated FFE during the DE process. Two teachers in particular reported that they were very tired in DE. Teacher Kemal said, "I realized what a beautiful place the school is. I look at it as a positive influence. In other words, we missed the school, we missed the students, we missed the class atmosphere." Ahmet teacher, on the subject of DE, said, "He actually created a solution for us to see that we can all do something without coming together or we can do something without coming together with the student." Hasan teacher said, "We can evaluate this (DE) in various seminars and so on. But I firmly believe that we do not have the luxury of doing this formal education remotely." All the teachers stated that they preferred FFE to DE. Ahmet teacher expressed his thoughts "Face-to-face education is an important and absolutely indispensable situation." Ahmet teacher stated that DE can be preferred as an assistant for reinforcement purposes.

Teachers also stated the positive effects of DE. Mathematics teacher Mehmet DE emphasized that the topics are handled faster, the writing load of the students is reduced, and thus they can solve more questions. Kemal teacher expressed “The biggest positive effect is that technology is now used by everyone, and teachers who do not know how to use the phone have to learn technology.” All teachers stated that DE contributed to the use of technological equipment. Hasan teacher “It gave us the opportunity to transfer our documents on paper to digital media, out of necessity.” Ahmet teacher stated that they increased the number of digital resources during this period. Teacher Mehmet, on the other hand, stated that they realized that the devices in their hands were insufficient in terms of equipment.

Teachers detailed the materials they used in DE as pdf files (textbook, resource book, question book), videos, animations. For Kemal teacher DE, “The biggest advantage is that the teacher learned about EBA (Educational Information Network). He saw how adequate or insufficient the materials in the EBA were.” Teacher Kemal stated that after DE, he used EBA resources more in FFE than before.

When the teachers compared their use of smart boards before and after DE, they stated that there was no big difference. Teacher Mehmet said, “We used the smart board in the same way. In other words, I reflect on the board from different sources, be it the school's books, and show less writing, more questions, and more examples.”

However, the teachers stated that the content they used on the smart board became richer after DE. Teachers stated the applications they use on the smart board as pdf files (textbook, resource book, question book), videos, animations. Hasan teacher said, “I use the smart board more in terms of visuals. I use it in PDFs, I use it in solutions to questions, there are animations ... I used animations a lot. There are also those short videos prepared by the National Education. I used them from time to time without using the sound in order to benefit from the visuals there. This process has already brought along the wealth of documents.” The researcher asked the teachers whether they used simulation, exam applications with instant feedback such as Kahoot, and different web 2.0 tools in their lessons. Teachers reported that they did not use these tools during and after DE. In the interviews, some situations that were reflected in FFE with the effect of the DE, although not before the DE, were also expressed. In DE, it was stated that students reached teachers by phone and via social media. Hasan teacher compared the situation, “Before, the student did not even feel the need to get a phone number from us because he knew that he could find us at school. Therefore, he was not sending any questions ... Now we work in a way that we can express as 7-24. We are constantly getting questions, we are constantly interacting with questions. Just like I said, we evaluate videos and PDFs both on smart boards and on social media.”

#### **4. Discussion and Conclusion**

In all interviews, it was stated that students did not attend all classes during the DE process. Most of the students stated that they did not experience hardware and internet connection problems in DE. In this process, it can be said that the share of technical problems among the reasons why students do not attend classes is low. When we look at the reasons why students do not attend classes, it can be said that it is usually due to themselves, and for some students, it is due to the environment they are in. From the findings, it is understood that the students do not attend some classes in particular and devote this time to their own studies. It is seen that these students describe the DE period as productive. Students think that they can allocate more time to study for the university exam in this period compared to FFE. For this reason, it is understood that students want to take some courses online, even if there is no pandemic. Teachers reported that successful students can learn at DE, and that some students even turn this period into an opportunity to prepare for the university exam. However, teachers also said that some students were negatively affected by the process and DE was not very productive for students with medium and low success levels. In a study conducted with 12th grade students, it was concluded that the efficiency of the students from DE may be related to their academic self-efficacy levels (Çetinkaya & Asıcı, 2021). In this context, it may be beneficial to provide a teaching environment where students can choose their courses as DE or FFE under the supervision of a teacher, depending on their competencies.

In the DE process, it was determined that the students preferred to attend the mathematics, physics, chemistry and biology courses that they prepared for the university exam. The teachers of these courses also stated that the

students mostly attend their classes. It is understood from the findings that the courses most attended by the students are mathematics and physics. When the reasons for this were questioned, it was revealed that students' expectations for the lesson, such as learning a question-solving technique, were the determining factor. It can be said that students in DE prefer the courses that meet their expectations more.

Teachers indicated that they missed FFE during the DE process and said that they preferred FFE to DE. Nearly all of the students especially want the courses related to the field in which they are preparing for the university exam to be held face-to-face. These findings are in agreement with many research results (Birişçi, 2013; Tuncer & Bahadır, 2017; Bali & Liu, 2018; Karatepe, Küçükgençay & Peker, 2020). Ebner and Gegenfurtner (2019) concluded that student satisfaction in synchronous webinars is lower than in traditional FFE. It is understood from the findings that the teachers transferred the contents they used in FFE to the DE environment as they were. In their study, Stevens et al. (2021) stated that instead of transferring the FFE content of teachers to the DE environment as it is, this content should be restructured in accordance with DE. In this context, one of the reasons for students to prefer FFE to DE may be that educators cannot create a suitable teaching environment for DE.

Although the teachers had some difficulties in the DE process, they stated that this process contributed to all teachers professionally. It has been understood that teachers generally think that their colleagues benefit from the use of technology. In particular, they stated that this process gave them the opportunity to transfer their paper documents and materials to digital media and they used the smart board actively before DE. Result of the study that with teachers at different levels by Başaran et al. (2021) is similar to this finding. Participating teachers explained that their use of smart boards did not change much after DE. Students, on the other hand, stated that teachers who did not use the smart board before started to use it, and teachers who use it now use it more often in the FFE after DE. Although this finding is expected, it does not fully coincide with the discourses of the participating teachers on this issue. It can be said that this finding may be more relevant to the teachers who attend the other courses of the students.

It was found out that teachers mostly used textbooks, question books and source book PDF files, videos, animations on the smart board after DE. From the findings, it is understood that there is not much change in the applications used by the teachers on the smart board before and after the DE. However, it is understood that teachers enriched the contents of the applications they used before in DE. It was concluded that the teachers did not use different web 2.0 tools before and after the DE. In the literature, it has been determined that the number of teachers who can use web 2.0 tools in DE is low (Basaran et al., 2021). One teacher emphasized that there was an awareness about EBA during the DE period. He stated that he started to use the resources in EBA more after DE. Looking at the literature, it is understood that more than half of the teachers did not use EBA in their lessons before DE (Türker & Güven, 2016; Tutar, 2015). EBA contents were enriched in DE and teachers had to use EBA. This situation may have affected the teachers' use of EBA in their lessons after DE. It can be said that DE contributes to the enrichment of the content used by the teachers on the smart board, but it does not have much effect on using different applications.

One of the effects of DE on FFE is that students communicate with teachers outside of school hours. In DE, teachers and students used their phones to communicate (Güvercin, Kesici & Akbaşı, 2021). Students who do not know their teachers' phone numbers before DE can reach their teachers by phone at any time after DE.

Teachers and students think that there is definitely a difference between DE and FFE in terms of classroom communication. Teachers and students stated that FFE is more advantageous in terms of classroom communication.

Teachers stated that communication was weak due to the inability to use body language, gestures and mimics in the DE. Students also agree with this opinion. Similar findings have been found in studies conducted with students in the literature (Arik et al., 2021; Kocaman & Ersoy, 2021). Participating students and teachers recommend that everyone in DE have their cameras turned on. In addition to these, a teacher is of the opinion that attendance should be taken in DE. It has been stated that it would be beneficial to use multiple communication channels in audio, video and written form in order to create an efficient learning environment in online courses (Dixson, 2010;

Vlachopoulos & Makri, 2019). In this context, it can be said that the open cameras in DE will positively affect the interaction and teaching in the educational environment.

Some differences of opinion have been identified about in-class communication in FFE post-DE. Some students argue that after DE, in-class communication weakened compared to the period before DE. Some students who object to these thoughts of their friends claim that this is related to the fact that the pandemic is not over yet. In this regard, two participating teachers stated that communication was negatively affected due to the use of masks. On the other hand, two other teachers reported that there was no difference in classroom communication due to the pandemic, and that they continued their education from where they left off. One of these teachers stated that there might be a difference due to the grade level. This view is similar to the views of some students. In this study, it was assumed that there might be differences due to the developmental levels of the students. However, these findings are insufficient to reveal that the changes perceived by some students and teachers regarding in-class communication are due to the developmental levels of the students. However, when we look at the interviews in general, it can be said that the majority of the participants believe that when the pandemic is completely over and the mask is not used, the in-class communication will be similar to FFE before the DE.

Teachers stated that they opened a class discussion in their classes at FFE after DE. Some teachers declared that they increased the discussions during this period and that the students were willing to talk. The students discussed the subject of class discussion in connection with in-class communication. Contrary to the teachers, it is understood that the students have different opinions on this issue. Some students do not notice a difference in class discussion when compared to before DE, while others state that it has decreased. Despite the fact that students share the same teaching environment, the difference in their perceptions about in-class communication and discussion is remarkable.

## 5. Recommendations

It can be researched why the difference in students' perceptions of classroom communication and discussion in FFE after DE arises. It is believed that an in-depth examination of the subject of classroom communication after DE will be beneficial.

Recently, hybrid approach has come to the fore in which FFE and DE are combined. When the results of the research are examined, it is seen that the students want to take some courses with FFE and some courses with DE. Teachers also think that DE is advantageous for some students. It is thought that it would be beneficial to conduct research on the efficiency and economy of hybrid education-teaching environments.

Considering that DE will take place in the next education processes, it is thought that it will be beneficial to inform teachers about preparing content suitable for DE environments and classroom management in DE. In this context, it is recommended that the Ministry of National Education provide in-service training on these contents.

## 6. Limitation

This research is limited to the data obtained from interviews with twelve students studying at a General Secondary Education institution in Türkiye/Ordu and their mathematics, physics, chemistry and biology teachers.

In this study, FFE experiences of the participating students in the 9th and 10th grades were compared with their experiences in the 12th grade. In this process, it is assumed that there may be differences due to the developmental levels of the students.

The focus of this research is post-DE FFE environments. However, in the interviews, it was observed that the participants tended to talk more about their DE experiences. Although the researcher asked questions about post-DE, it was determined that the DE experiences were included more in the answers given. There could be several reasons for this situation. One of the reasons may be that the subject was discussed in the context of the effects of DE on FFE in the study. On the other hand, the fact that the participants' DE experiences are still very new and

very different from the ones they have experienced in the training process may have increased their desire to talk about this issue. Another reason may be the desire of the participants to share their suggestions with the thought that DE will take place in the education-teaching processes from now on.

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