

## Review of student opinions on blended educational implementations in the pandemic process: A case study

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Article Info	Abstract
<p><i>Keywords:</i></p> <p>Flipped classroom Emergence remote teaching Distance flipped classroom Blended education Vocational school</p> <p>Research Article</p>	<p>The study has aimed to examine student views and experiences related to distance education, flipped classroom, distance flipped classroom, and face-to-face learning activities carried out over the semester. In this context, student opinions regarding mixed educational experiences in four courses planned and carried out over a semester were examined according to the blended education practices implemented by the Council of Higher Education with the fall semester of 2021-2022. In the research planned as a case study, 42 students who studied in the first year of the vocational school computer programming associate program formed the working group. The opinion survey developed by the researcher was used. Content analysis and descriptive statistics were used in the analysis of the obtained data. As a result of the research, it was found that flipped classrooms and distance flipped classrooms are effective applications in students' learning, and pre-class videos are an important resource for students to come prepared for lessons and repeat the course.</p>

### 1. Introduction

With the outbreak and spread of Covid-19, many countries have suspended face-to-face education and immediately switched to the online education model. Turkey has been among the countries that have brought their learning and teaching activities online at all levels of education. The educational consequences of the crisis caused by the epidemic have undoubtedly affected many stakeholders, from students to teachers, corporate administrators to parents. A number of developments that came into our lives with Covid-19, especially the closure of schools at the global level and the implementation of strict social distancing measures, have also led to rapid changes in traditional forms of education and training (Yılmaz, Karabulut, Uçar, & Uçar, 2021). However, the needs of students at different levels and stages have diversified (Montacute & Holt-White, 2021), and the use of technology by students and teachers has become even more important (Yılmaz et al. 2021).

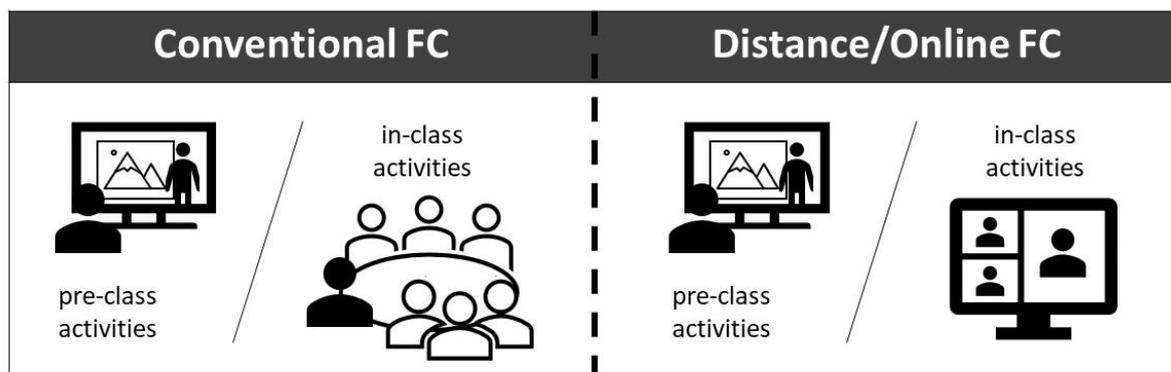
One of the issues that should be emphasized here is the more intense introduction of innovative educational approaches, which are thought to be an alternative to traditional face-to-face teaching before the outbreak occurs, and even greatly eliminate its limitations. "Flipped Classroom" (FC) is one of the leading approaches. FC, one of the models that the Council of Higher Education (CHE) (2021) has noted and proposed to be used within the framework of the "Global Pandemic Education and Training Processes Guide", started to be discussed on scientific platforms in the 1990s; especially since the early 2000s, when

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it gained its conceptual structure, it has been the subject of many types of research. In this way, new paradigms, technology approaches, and applications that emerged before the epidemic period are already reflected in teaching. On the other hand, it is thought that the effects of these approaches will continue in the post-epidemic period, even if they undergo certain changes from time to time. Because it is important to note that the special regulations implemented during the Covid-19 crisis leave a lasting mark, that the spread of online learning will accelerate further, and that schools need to organize themselves in a more systematic way to follow the aspects of technology-based learning that they find most useful. In other words, all institutions will benefit from the mechanisms they have established to maintain their education and training missions during the crisis period after the outbreak (Daniel, 2020). This situation requires the investigation of many issues such as the applicability, limitations, and position of approaches within the learning culture. It is important to examine all aspects of the approaches or their specific dimensions and to examine the meaning expressed by all stakeholders of the system, especially students and instructors. These include Emergence Remote Teaching (ERT) and Distance/Online Flipped Classroom (DFC), which blended FC.

ERT envisages a temporary shift of teaching to an alternative distribution mode due to crisis conditions. The primary purpose here is to re-establish a robust educational ecosystem, but rather to provide access to educational activities quickly and reliably in emergencies or during a crisis (Hodges, Moore, Lockee, Trust, & Bond, 2020). FC, the other component of DFC, where course content, narration, and materials are moved out of class hours; it is an innovative teaching approach in which the course time is divided into student-centered activities to clarify the subject and reinforce learning (Bergmann & Sams, 2012; Mason, Schuman, & Cook, 2013).

Although FC mainly hosts in-class face-to-face teaching activities, it has been developed and adapted to online environments over the years due to the development of information technologies and the covid-19 pandemic's ability to bring learning activities to online environments. Adapted to online environments, this model is called DFC. The FC model is adapted by Jia, Hew, Bai, and Huang (2021) for distance education in Figure 1.



**Fig. 1.** FC and DFC Structure

As shown in Figure 1, the learning activities to be carried out extracurricular in both models are the same structure. The difference is in the number of participants in-class activities. Accordingly, face-to-face learning activities carried out during class hours at FC are carried out with live lecture sessions (video conferences) configured simultaneously in DFC. In addition to Figure 1, the Sanandaji and Ghanbartehrani (2021) adapted version of normal teaching, FC and DFC structures is given in Figure 2:

	Normal (Traditional) Teaching	FC	DFC
Pre-Class		Lectures	Modular Video Lectures, Preparation Assignments
In-Class	Lecture	Active Learning Activities	Online Discussions Online Mini-Activates Online Help Sessions
Post-Class	Homewrok	Homework	Homewrok Lives Lesson Recordings Extra Help Resources

**Fig. 2.** Normal (Traditional) Teaching, FC, and DFC Structure

Unlike Figure 1, Figure 2 details the teaching process at DFC. Accordingly, the students are presented with modular content in a modular structure, unlike FC, and students are given the responsibility of coming to the course prepared; online discussion, small events, and additional online sessions for support/assistance purposes during the course; After the course, in addition to homework, live course recordings and additional auxiliary resources are shared. In this respect, since students will carry out the entire process of the course through distance education, the structure and diversity of teaching materials to be used to ensure students’ learning and permanence in learning is important. However, in addition to the pedagogical knowledge of the instructor, the quality and competence of the instructor in the context of performing DFC will be effective in ensuring the gains of the course.

Although there were many studies on DFC in the literature, no studies were found in Turkey. Therefore, not enough scientific information is available about the implications of DFC's practices in Turkey on learning processes. International studies are largely in the form of comparing FC with DFC. In an experimental study conducted over a period with students studying at the faculty of education of a public university in Hong Kong, it was observed that the students' interest levels were consistently high in DFC as well as in FC (Jia et al. 20219). Furthermore, as a result of the analysis of the data obtained, it was concluded that problem-based learning, teaching diversity, and instructor qualification factors supported by interaction, feedback, active learning, explanations, and real-life examples are the five main factors that encourage students to participate in DFC. As a result of the analysis of the data obtained in the experimental study conducted over two semesters with the students who took the Information Systems course at the undergraduate level, it was determined that DFC is an effective pedagogical approach (Sanandaji & Ghanbartehrani, 2021). In the experimental study conducted with students studying in different faculties and departments at a university in China and learning English as a foreign language, it was found that the students who participated in the study had positive perceptions of DFC depending on the variety of interaction during teaching and the functionality of the platforms used (Ma & Luo, 2021). In addition, some students have noted that the platforms used impose online interaction, which leads to stress.

Since DFC is a model that has emerged in recent years, it has not yet been fully demonstrated in the literature what effect it will have on different teaching levels, different departments, and student characteristics in teaching environments compared to FC. Although studies were comparing FC and DFC in the literature, no research comparing distance education (DE) activities carried out as a continuation of ERT and DFC was not found. Also, to the best knowledge of the authors, no study where DFC is examined with experimental research exist in the literature in Turkey. The research to fill the existing gap in the field article; is aimed to examine student opinions and experiences related to distance education, inverted

classroom, remotely inverted classroom, and face-to-face learning activities carried out over some time. For this purpose, the following questions were sought:

1. According to the experiences of the students during a fall semester:
  - a. What are his views on the courses held with FC?
  - b. What are his views on the courses held with DFC?
  - c. What are the comparative views of students towards FC and DFC?
  - d. What are their views on the teaching materials used in the courses (pre-course video, live course recording, and documents)?
  - e. What are their opinions on the assignments and practices performed?

Due to the Covid-19 pandemic, the teaching activities carried out in higher education started with the academic year 2021-2022. Therefore, it is not yet known exactly what the learning outcome potential and learning experiences are as a result of the teaching activities applied. However, the fact that students take together teaching models such as distance education, face-to-face education, and FC in the same process also stands out as an issue that should be examined in terms of student experiences. In particular, the examination of the experiences and opinions of the students who leave their normal lives and transition to a different environment such as dormitories, houses and similar and in some cases have to share the same environment with different students has the potential to have a positive effect in achieving learning goals in the courses. On the other hand, for instructors who perform face-to-face and distance training in the current process, this research will be informative and will serve as an auxiliary resource in determining the teaching models that instructors will use in their courses.

## **2. Methodology**

In the study, students' opinions were examined based on their experience in courses taken in the form of FC, DFC, DE, and face-to-face normal teaching (FF) over the same period. This situation, which was examined, emerged as a question based on the own experience of the researcher. The answer to this question needs to be described and examined in depth. For this reason, a case study based on qualitative research methods in the research was conducted (Merriam, 2009).

### *2.1. Participants*

Participants were selected based on purposeful sampling method to help best demonstrate the purpose of the research (Creswell, 2013). Students enrolled in the computer programming associate program at the vocational school of technical sciences, which is affiliated to a public university where the researcher gave four different courses as an instructor, formed the participants. Among the 52 students enrolled in the program, there were 47 students who took the courses and were not absent. 42 students participated voluntarily in the data collection process. Of the 42 students, 7 were women and 35 were men; the average age was 18.43. All students studied in the first grade and took the courses for the first time. Thirty-seven participants stated that they had no previous distance learning experience. 5 participants stated that they had the experience of distance education during high school.

Participants stated that they were connected to the courses carried out by distance education with a smartphone or a computer since the start of the lessons. 5 students who do not have a computer personally stated that they follow the courses from the library.

### *2.2. Procedure*

In the fall semester of the 2021-2022 academic year, when the research question is not yet clear, Information Technologies (IT) and Graphics and Animation (GA) courses are planned by the researcher to be carried out with FC and Computer Hardware (CH) and Desktop Publishing (DP) courses with DFC in the first year of the computer programming associate program. In the process, the question of what situation can arise

when direct FF instead of FC and DFC are taught directly in the form of ERT. Since the use of different learning activities together due to the epidemic process is still a new process, a clear answer to the question sought as a result of the field summer scans was not obtained. Therefore, this study was planned by the researcher and applied to Manisa Celal Bayar University Social and Human Sciences Scientific Research and Publication Ethics Committee. This research was deemed ethically appropriate at the meeting of the ethics committee dated 20.12.2021 and numbered 2021-12. In this process, FC and DFC applications were removed in the weeks after the midterm exam and FF and DE courses were carried out. At the end of the semester, before the final exam week started, the online form was sent to the students and they were asked to contribute voluntarily. Of the 47 students, 42 filled out the form and formed the participants of the study. Information on all processes and how the lessons take place is given in Figure 3.

<b>Face to Face Lessons</b>	Information Technologies & Graphics and Animation Courses	<b>First Seven Weeks</b>	<b>Midterm Exams</b>	<b>Last Seven Weeks</b>	<b>Data Collection Process</b>	<b>Final Exams</b>
	Computer Hardware & Desktop Publishing Courses	<ul style="list-style-type: none"> <li>Based on Flipped Classroom Model</li> <li>Used Google Classroom and Telegram Group</li> <li>Video(s) and document(s) sharing was done a week before the lesson                             <ul style="list-style-type: none"> <li>31 videos and 6 documents were shared for pre-lesson study in Information Technologies Class. The average duration of the videos was calculated as 9.41 minutes. 8 homework assignments were given.</li> <li>14 videos and 4 documents were shared for pre-lesson work in the Graphics and Animation Class. The average duration of the videos was calculated as 20.92 minutes. 4 homework assignments were given.</li> </ul> </li> <li>In the face-to-face lessons, applications related to the subject were made in the computer lab.</li> </ul>		<ul style="list-style-type: none"> <li>Face to Face in Computer Lab.</li> <li>Used Telegram Group</li> <li>Lecturing and applications were carried out face-to-face in the computer lab.                             <ul style="list-style-type: none"> <li>An extra document, video, etc. not shared.</li> </ul> </li> </ul>		
		<ul style="list-style-type: none"> <li>Based on Distance Flipped Classroom Model</li> <li>Used Office 365 Teams and Telegram Group</li> <li>Video and document sharing was done a week before the lesson.                             <ul style="list-style-type: none"> <li>7 Videos and 7 Documents Shared for each lesson.</li> <li>Average video duration, 19.57 Minutes for Computer Hardware Lesson, 22.9 Minutes for Desktop Publishing Class</li> </ul> </li> <li>Live lesson recordings were also shared after each live lesson                             <ul style="list-style-type: none"> <li>Discussion, problem solving, and question-answer activities were held in Computer Hardware live lessons. 2 homework assignments were given.</li> <li>Digital product development (magazine, poster, brochure, etc.) was carried out with application software in Desktop Publishing Course. 5 homework assignments were given.</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>Only Live lessons</li> <li>Used Office 365 Teams and Telegram Group</li> <li>Lectures and practices were carried out as live lessons with Office 365 Teams.                             <ul style="list-style-type: none"> <li>Live lesson recordings and documents were also shared after each live lesson</li> </ul> </li> </ul>		

**Fig. 3.** Research Process

### 2.3. Data Collecting Tools

As data collection tool, an "Opinion Questionnaire" consisting of a total of 18 items, open-ended, multiple-choice, and Likert-type, prepared by the researcher as a result of literature review, was used. The opinion survey includes demographics, FF vs. FC, FC vs. DFC, DE vs. DFC, videos, homework, and implementations categories. The 7 items in the 15-point form are Likert-types and there are a total of 39 expressions in these articles. Since there was no improved data collection tool for the research in the field article, a new tool was prepared.

After the opinion survey was prepared, it was first examined by a scientist who is an expert in Turkish education and necessary arrangements were made in terms of language. Secondly, the questionnaire form was examined by 3 scientists who are experts in the Computer Education and Instructional Technologies (CEIT) field and expert opinion was taken. In line with expert opinions, necessary arrangements have been made in the form. The opinion survey was then applied to 10 CEIT graduates and teachers for trial and control purposes. As a result of the questions and suggestions from 10 people, the opinion survey was

revised, and the final survey was formed. The opinion survey was made into an online form using the Google Forms tool and applied to students.

#### 2.4. Data Analysis

The analysis of the data was carried out in two stages. In the first stage, open-ended items and Likert-type items were analyzed separately. Answers to open-ended questions are analyzed with content analysis; put into categories using codes and themes. The responses to Likert-type items were made by descriptive statistics and tabled with frequency information. In the second stage, the findings of Likert-type items were interpreted by comparing the aspects given to open-ended items. Some findings include frequency (f), and others include the number of participants (N).

#### 2.5. Validity and Reliability

The researcher participated as a lecturer in all of the courses carried out within the scope of the research. Participants in the research were selected voluntarily and answered all questions in the data collection tool. In addition to collecting data with Likert-type items, data collection was carried out with open-ended substances to obtain more detailed information. During the analysis phase of the data, findings were created impartially without adding any interpretations. Content analysis was carried out separately by researchers and two scientists who are experts in the CEIT and have knowledge of the research process. Percentage agreement was calculated by comparing the results of the analysis. For the percentage agreement, Cohen's Kappa values (Cohen, 1960) were calculated. The values were calculated as  $K=0.82$ .

#### 2.6. Findings

Participants were asked to mark the most appropriate expression that could come to the gaps in the following statements, considering the lessons carried out with FC. Descriptive information about the responses given is provided in Table 1.

**Table 1.**

Descriptive Analysis of Views on FC

Weekly shared course materials (video and others) and activities (homework and practices) were _____ in my learning.					
	Very Ineffective	Ineffective	Neutral	Effective	Very Effective
N	0	0	3	18	21
The weekly announcements and notifications were _____ in my learning.					
	Very Ineffective	Ineffective	Neutral	Effective	Very Effective
N	0	0	5	15	22
Studying the shared videos and coming to the lesson prepared and making applications in the lesson was _____ in my learning.					
	Very Ineffective	Ineffective	Neutral	Effective	Very Effective
N	0	0	1	13	28
Without FC, without sharing lecture videos, if only lectures were made in the lab., I would have learned _____.					
	Very Ineffective	Ineffective	Neutral	Effective	Very Effective
N	9	16	13	2	1
After studying the pre-class videos, face-to-face applications in the lab became _____ in my learning.					
	Very Ineffective	Ineffective	Neutral	Effective	Very Effective
N	0	0	2	14	26

When the information provided in Table 1 is examined, it is seen that the opinion that FC applications are effective in the learning process of students. In the weeks of FC application, the number of students who

expressed a neutral opinion regarding the effectiveness of teaching directly in the form of FF without FC application is 13. It is foreseen that this is because the students are still in the first semester of the first year and they cannot make any predictions due to the lack of a course period they have taken in the form of FF during their university lives. In addition, participants were asked to mark the most appropriate expression that may come into the gaps by comparing FC (before midterm) and FF (after midterm exam) practices in the courses. The description of the responses given is presented in Table 2.

**Table 2.**

## FC-FF Comparison

Expressions	FC Was More Effective (N)	FF Was More Effective (N)
_____ in my learning	40	2
_____ in practicing	40	2
_____ in in communicating with the teacher	30	12
_____ in repeating the lesson	39	3
_____ in my success	40	2
For me _____	40	2

Compared to FC vs. FF, students were largely found to parallel to the findings of Table 1, indicating that FC was more effective. Only, there was no common opinion from the students regarding the process of communicating with the instructor. This may have been caused by the process of communicating with the instructor in the pre-class and post-class process in the FC environment and verbally in the FF environment. On the other hand, they may have considered this situation as FF because they can ask face-to-face questions in in-class at FC. The students for the FC-FF comparison have also been consulted in writing and the findings of these opinions are given in Table 3.

**Table 3.**

## Thematic Display of Opinions on FC-FF Comparison

Theme	Sub-Theme	Code	f <sub>FC</sub>	f <sub>FF</sub>
Pre-Class	Lesson Preparation	Preparing for the lesson	28	
		Possibility to do extra research/practice	14	
		Self-regulation	6	
	Videos	Ability to work at individual pace	24	
		More suitable for person with special needs	2	
		More detailed learning	5	
Focus on the lesson		3		
In-Class	Implications	Opportunity to practice more in the lesson	20	
		Practicing knowing what you are doing in the lesson	10	
	Learning	Engagement of learning	15	
		Facilitator of Learning	13	
		Persistence of learning	9	
Limitations	General	More stressed	1	4
	FF	Unprepared for class		9
	FC	Video Adaptation problem-not being able to focus	1	
		Inability to find time to watch videos	1	
General		More effective/efficient	32	3
		Both equally effective		7

Table 3 shows that FC’s views are particularly positive in the way students come to class prepared. However, most of the students stated that they learned better because they could work as they wished individually to the videos given to them to work before the lesson. When they came to the course prepared, they stated that they reinforced the subject they worked on better before the lesson and that what they learned was more permanent because more applications could be made in the course. On the other hand, only three students stated that they did not have time to watch the videos or focus on the videos because they worked out-of-school hours. For courses held without FC, some students considered this process a waste of time because there were fewer applications in the course than there was a lecture. At the beginning of the semester, the course plan with the information about the courses to be explained, the applications to be made and the assignments to be given for all the courses to be given every week during the semester was shared with the students. Therefore, the student has the opportunity to learn about the learning activities to be carried out in the relevant week by looking at the course plan and conducting research before the course if they wish. Despite this situation, some students stated that they came unprepared for the lesson because they did not know what to do that week at FF and there were no pre-class videos. The statements quoted from students are as follows:

*“... The fact that we came to the lesson mentally and informationally prepared before the midterm exam was more effective in focusing and adapting to the lesson.” (PM3)*

*“The coursework before the midterm exam was somewhat better. Because we were watching the videos and there was a short narration in the laboratory. Afterwards, with the application, the subjects were consolidated better.” (PM4)*

*“The semester before the midterm exam was more productive for me. Learning the basics at school was a waste of time. Instead, it was more effective to learn the basics quickly at home, practice in class and ask questions.” (PM5)*

*“Pre-class videos are very useful in quickly repeating the places we did not fully understand and forgot in the lessons. I also prefer FC in practice because I am more available to reach different sources and repeat the subject.” (PM6)*

*“It was more effective before the midterm exam. It was an opportunity to practice both theory and practice. I had the opportunity to work on the subject requested from me for as long as I wanted... Along with the subject, I could learn other relevant information on the internet. When I encountered a problem, I would ask the teacher during the lesson and learn the subject well.” (PM7)*

*“It was more effective for me to teach the lesson directly in the laboratory and then practice it. Because I couldn't focus on the videos.” (PM11)*

*“Because practice is important for these courses, the courses before the midterm exam were better. Watching pre-class videos and practicing again and again helped me adapt easily when we came to the lesson. I was practicing knowing what I was doing in the lesson. It was a positive process in every way.” (PW2)*

Participants were asked to mark the most appropriate expression that could come to the gaps in the following statements, considering the courses carried out with DFC. The description of the responses is given in Table 4.

**Table 4.**

Descriptive Analysis of Views on DFC

Weekly shared course materials (video and others) and activities (homework and practices) were _____ in my learning.					
	Very Ineffective	Ineffective	Neutral	Effective	Very Effective
N	1	3	5	19	14
The weekly announcements and notifications were _____ in my learning.					
	Very Ineffective	Ineffective	Neutral	Effective	Very Effective
N	0	1	6	19	16

Studying the shared videos and coming to the lesson prepared and making applications in the lesson was _____ in my learning.					
	Very Ineffective	Ineffective	Neutral	Effective	Very Effective
N	1	0	5	17	19
Before the lesson, if the lecture videos were not shared, I would have learned _____ if there had been only live class.					
	Very Ineffective	Ineffective	Neutral	Effective	Very Effective
N	10	11	10	7	5
After studying the pre-class videos, applications in the live class became _____ in my learning.					
	Very Ineffective	Ineffective	Neutral	Effective	Very Effective
N	0	0	4	21	17
It was _____ when I learned the live lesson recordings shared after the live class.					
	Very Ineffective	Ineffective	Neutral	Effective	Very Effective
N	2	0	6	12	22

Similar to the FC-related findings given in Table 4, it is seen that for DFC, students are largely influential in learning DFC. Unlike FC, it was found that the number of students who had the view that learning would be more effective by performing courses directly with ERT without DFC was higher ( $N_{DFC}=12$ ) than FC ( $N_{FC}=3$ ). This may be due to the fact that all learning activities in DFC are carried out through distance education, so students want to have a completely live lesson for these lessons carried out remotely, or because they do not want to work on pre-lesson videos because live lesson recordings are already available. On the other hand, similar to the prediction for the neutral 13 among FC findings (Table 1), it is thought that students cannot make a choice by comparing DFC with DE because they have no direct distance education experience in their university life, and 10 students are in the neutral condition. In addition to Table 4, participants were asked to mark the most appropriate expression that could come into the spaces by comparing DFC and DE applications. The description of the responses given is given in Table 5.

**Table 5.**

DFC-DE Comparison

Expressions	DFC Was More Effective	DE Was More Effective
	(N)	(N)
_____ in my learning	31	11
_____ in practicing	30	12
_____ in in communicating with the teacher	26	16
_____ in repeating the lesson	34	8
_____ in my success	29	12
For me _____	31	11

When DFC and DE were compared, in parallel with the findings in the FC-FF comparison, it was found that students mostly stated that DFC was more effective. In addition, the opinion that DFC is more effective in communicating with the instructor has become prominent. Although the same Teams application is used for DFC and DE, the fact that time management is more flexible in the in-class phase of DFC than in DE may have been effective in the emergence of this finding. When Table 2 and Table 5 are compared, students find FC more effective. The fact that the pre-class and in-class processes of FC are carried out in different environments, and in DFC, these two processes are carried out remotely / in the same environment may have revealed this effect. Parallel to the information in Table 5, written opinions were obtained from the students, and the findings regarding these opinions are given in Table 6.

**Table 6.**

## Thematic Display of Opinions on DFC-DE Comparison

Theme	Sub-Theme	Code	f <sub>DFC</sub>	f <sub>DE</sub>
Pre-Class	Lesson Preparation	Opportunity to repeat	10	2
		Opportunity to pause, rewind videos	8	2
	Videos	Preparing for the lesson	15	
		More beneficial	7	
		Feeling more comfortable in class	6	
Live Course	Without DFC	No time to ask questions in live class		4
		More efficient		3
		Having technical problems in the live class		1
		Inability to focus on the live lesson		1
	Implications	Opportunity to spend more time on the application	11	
After Class	Learning	Easier to learn the lesson	7	
		Learning is simpler and faster	3	
	Video + Live Lesson Record	Persistent learning and reinforcement of learning	13	
General	Live Lesson Record	Problems with some records		3
		More effective/efficient	19	2
		Better for theoretical lesson		1
		Both equally effective		7

As with FC, the DFC created a view that videos shared before class are useful for participating in lessons prepared, studying at individual speed, and repeating as they wish. In addition to the video shared before the lesson, they stated that their work made their learning more permanent. On the other hand, it has been found that students who have problems in some live lessons due to some technical difficulties and students who want to study live course recording by not attending the course due to visual problems in some live course recordings have difficulty learning the relevant topics. Similar to FC, they stated that they learned better because more applications can be made in live lessons in DFC. The statements quoted from students are as follows:

*"... I think they're both the same in terms of my learning. But FC was better because we had the pre-class videos before the midterm and we could watch it again and learn whenever we wanted. It was good that he was in constant dialogue with our teacher after the midterm exam...." (PM12)*

*"The subject took a permanent place in my mind by working on videos and then doing live lessons." (PM32)*

*"The pre-class videos system was better, as more time could be devoted to the application." (PM25)*

*"I was able to learn the subject by working on videos and taking notes. However, as a result of shifting the focus during the lesson, taking notes etc. it's getting harder." (PW6)*

*"Learning is simpler and faster with pre-class videos. The live lessons are both long and the lecture is very divided with questions..." (PM31)*

*"The information becomes more difficult to understand as we miss some things in the live lesson. Therefore, I think it is more advantageous to watch pre-class videos." (PM2)*

Participants were asked to mark the most appropriate expression that could come to the gaps in the statements given in Table 7 by comparing FC with DFC. Descriptive information about the responses given is provided in Table 7.

**Table 7.**

## FC-DFC Comparison

Expressions	DFC Was More Effective	FC Was More Effective	Both were effective	Neither was effective
Weekly shared course materials (video and others) and activities (homework and practices) were _____ in my learning.	2	25	15	0
The weekly announcements and notifications were _____ in my learning.	1	25	16	0
Studying the shared videos and coming to the lesson prepared and making applications in the lesson was _____ in my learning.	2	24	16	0
Without FC, without sharing lecture videos, if only lectures were made in the class, I would have learned _____.	2	21	19	0

When Table 7 was examined, it was seen that the majority of the students expressed the opinion that FC was more effective as a result of the comparison of the students in terms of learning FC and DFC. Nearly half of the students stated that there is no obvious difference between FC and DFC in terms of effect; Both models were found to be effective. When the answers given to Table 7 of the participants who found FF in Table 2 and ERT given in Table 5 more effective, were examined, it was seen that these participants did not make a balanced choice. Most of these participants stated that they found FC more effective, and secondarily, they found both effective. In addition to Table 7, the content analysis results of the opinions received from the students in writing are given in Table 8.

**Table 8.**

Thematic Display of Opinions on FC-DFC Comparison

Theme	Sub-Theme	Code	f
General	Videos	Preparing for the lesson	27
		Feeling in control of the subject	14
	FC & DFC	Both equal	10
	DFC	More effective/efficient	2
More comfortable		1	
Preference	FC	More effective/efficient	17
		To make an application	15
		In terms of repeatability	14
		To come to class stress-free	4
		To instantly correct errors-missing information	2

When Table 8 was examined, it was observed that the participants expressed opinions that may be consistent with Table 7. Participants stated that they were generally satisfied with the pre-class videos at FC and DFC and that it had a positive effect on their learning. However, the students have largely stated that FC is more effective and efficient, that the subject can be repeated in a face-to-face course environment, that more applications can be made, and that they are able to better correct their mistakes and deficiencies during the face-to-face course. The statements quoted from students are as follows:

*“FC was more effective in terms of implementation and repeatability.” (PM25)*

*“FC training is better. At that moment, we can correct the places where we make mistakes / do not understand with immediate intervention. I usually skipped over the parts I didn't understand in online classes.” (PW6)*

*“It was better to do live lessons after pre-class videos and supplementary materials were shared.” (PM32)*

*“...It was more effective when I listened and studied the videos you uploaded. At least I came to the lesson knowing the lesson and without stress..” (PW1)*

*“...There was not much difference for me. Both ways have been effective, I learned..” (PM8)*

*“The lesson made by sharing pre-class videos was more effective for me. We were able to have prior knowledge of the subject and watch it over and over again... Then it was more efficient to practice face-to-face” (PW5)*

Participants were asked to mark the most appropriate statement to fill in the blanks in Table 9 regarding the instructional materials used in the lessons in general. The description of the responses given is presented in Table 9.

**Table 9.**

Descriptive Analysis Results of Instructional Materials Used in Lessons

My learning of pre-class videos in DFC has _____					
	Very Ineffective	Ineffective	Neutral	Effective	Very Effective
N	0	0	0	20	22
My learning of pre-class videos in FC has _____					
	Very Ineffective	Ineffective	Neutral	Effective	Very Effective
N	0	0	0	15	27
Lesson recording videos created after live class were _____ in my learning.					
	Very Ineffective	Ineffective	Neutral	Effective	Very Effective
N	2	1	2	13	20
In addition to pre-class videos in DFC, shared documents and similar resources were _____ in my learning.					
	Very Ineffective	Ineffective	Neutral	Effective	Very Effective
N	0	0	0	18	24
In addition to pre-class videos in FC, shared documents and similar resources were _____ in my learning.					
	Very Ineffective	Ineffective	Neutral	Effective	Very Effective
N	0	0	0	13	29

As shown in Table 9, all participants stated that they found the pre-class videos and documents shared before the course effective. However, three participants stated that the live course recordings were ineffective, and two participants stated that they were neutral to the effect of these recordings. In addition to these findings, students were consulted in writing and implementation of the content analysis. As a result of the content analysis, it was discussed that the students only gave opinions about the videos (Table 10).

**Table 10.**

Descriptive Analysis Results of Instructional Materials Used in Lessons

Theme	Sub-Theme	Code	f
Videos	Pre-Class Videos	Very good for lesson preparation	22
		Was more effective/efficient	17
		Short duration	9
		More professional	8
		More memorable	7
		Better for taking notes	4
		Suitable for individuals with special needs	2
	Live Class Records	Having splits-distractions	12
		Possible problems with live class recordings	6
		Long lecture time	3

	Not required in DFC	3
	More efficient than taking notes in class	1
Pre-Class Videos and	Both must be for distance learning	8
Live Class Records	Both help to repeat the lesson	3
Together	There is no difference between the two	4

All participants expressed a positive opinion regarding the pre-class videos. It is stated that the videos are especially effective in coming to the lesson prepared and efficient in their learning. In addition, the fact that the videos are more professional recordings and have a short duration have been among the positive opinions that stand out. However, since DFC has pre-class videos and the duration of the videos is shorter than live course recordings, some of the participants stated that live course recording videos are unnecessary and pre-class videos are sufficient. On the other hand, the participants stated that there are situations where the course is divided according to the questions asked and they may be distracted because the subject narration time is extended because questions come from the students during the live lesson, and sometimes there are problems in displaying the content in the live course recordings, so they cannot get efficiency from some live course recordings. Some participants have the opinion that if distance education is going to be done, it should definitely be in the form of DFC. The statements quoted from students are as follows:

*“Pre-class videos are better to be shared. Re-working the live class recordings is not very productive.” (PM1)*

*“The pre-class videos were better than the live class records. We didn't have to repeat the live class videos because we watched the pre-class videos before.” (PW7)*

*“The pre-class videos were more effective because they were prepared more professionally.” (PM15)*

*“Since the live class recordings are long duration, I can't watch it. However, 3 or 5 short pre-class videos taken before the lesson keep people's desire to watch at a normal level.” (PW6)*

*“Working with pre-class videos is more efficient. Because there were visual problems in some of the lecture recording videos.” (PW5)*

*“Pre-class videos were more effective. Because in live class records, there are divisions within the lesson. Some ask questions etc...” (PM9)*

*“Live class recordings are divided and no longer simple and understandable. A topic that can be explained in 10 minutes becomes 20 minutes or more in live class.” (PM31)*

Participants were asked to mark the most appropriate expression for the gaps in the following statements regarding the assignments and practices given. The description of the responses given is given in Table 11.

**Table 11.**

Descriptive Analysis Results of Homework and Applications Used in Classes

My learning of homework and applications used in class in DFC has _____					
	Very Ineffective	Ineffective	Neutral	Effective	Very Effective
N	1	2	12	18	9
My learning of homework and applications used in class in FC has _____					
	Very Ineffective	Ineffective	Neutral	Effective	Very Effective
N	0	0	2	20	20
The practice and question-answer activities in live class were _____ in my learning.					
	Very Ineffective	Ineffective	Neutral	Effective	Very Effective
N	1	2	9	15	14
The practice and question-answer activities in lab. were _____ in my learning.					

	Very Ineffective	Ineffective	Neutral	Effective	Very Effective
N	0	0	5	17	20

As shown in Table 11, the majority of participants stated that were effective in learning about assignments and practices performed in the form of face-to-face. On the other hand, more than half of the participants said that it was effective in their learning, but there were a small number of participants who thought it was ineffective and remained more neutral than face-to-face. This difference has the potential to arise due to the fact that application and Q&A activities are carried out in a face-to-face environment at FC. However, the findings of the content analysis of the opinions received in writing are given in Table 12.

**Table 12.**

Content Analysis Results Regarding Homework and Practices Performed in Classes

Theme	Sub-Theme	Code	f
FC	Positive	More effective	23
		Better for getting support	10
		Encouraging to learn	8
		More realistic	7
		More serious	5
	Negative	Falling behind due to individual speed	1
DFC	Positive	Less tiring and comfortable	3
		More effective	1
	Negative	Difficult to adapt	3
		Doesn't seem to be taken seriously	1
General		Both are effective	15

Participants expressed a largely positive opinion of FC regarding the assignments and practices carried out in the courses. There are more participants who think DFC is more effective than those who say that assignments and practices in FC and DFC are equally effective. In a more real and serious environment for FC, there are participants who say that carrying out assignments and practices has a positive effect on their learning, while DFC has participants who say that homework and practice are less tiring and comfortable. In DFC, it can be said that students are more comfortable than face-to-face work environments, especially since applications take place individually outside the classroom environment. Because in a face-to-face environment, the student must carry out the application simultaneously with his peers and follow the course flow. The same is true during the live lesson. However, since the student does not see the entire class simultaneously in the live lesson, the student is probably experiencing less stress to train the application. This may be affecting the student's less tiredness. On the other hand, since b is lagging behind its peers in face-to-face applications due to the difference in speed, the opinions that it is more effective to learn with live lessons and that it is difficult to adapt to applications in live lessons, and that studies are not taken seriously enough because everyone is connected remotely have also been included as few negative findings. The statements quoted from students are as follows:

*"Face-to-face assignments are easier to understand" (PM10)*

*"In the face-to-face applications, I was experiencing problems due to the time problem and the noise that occurred during the application in the classroom. However, the applications and homework in the live class are both from the bus commute times, etc. I was saving money and I could do the applications in a more optimal environment." (PM26)*

*"The applications made in face-to-face education were encouraging for us to learn, as well as the atmosphere and seriousness of the exam." (PM3)*

*“The homework and practices given in the face-to-face training were better than the other. Because we were face to face, we could ask a question and get an answer instantly.” (PM4)*

*“Face-to-face applications were more effective. Online people don't seem to be taken seriously. I was coming face to face knowing what to do next” (PW1)*

### 3. Conclusion and Suggestions

During the restriction process implemented due to the Covid-19 pandemic, learning processes were continued with ERT. As of the fall semester of the 2021-2022 academic year, CHE has replaced the ERT process with blended learning applications due to the decrease in the impact of the epidemic in society but not fully neutralized. In this context, in addition to FF, lessons were carried out by blended learning processes through DE. Although the online learning carried out in this process is expressed as DE, it can actually be considered as a continuation of ERT. Because these activities were introduced due to Covid-19 epidemic conditions, they were introduced by CHE before the start of the academic term. In other words, it is a continuation of a situation. In addition, it has been proposed to base the learning process on applications such as FC. FF and DE processes are combined; Since a learning process involving applications such as FC and DFC have not taken place before, how the effectiveness of the learning activities carried out has come to the fore as an issue that needs to be investigated. In this context, it is aimed to examine student opinions and experiences related to DE, FC, DFC, and FF learning activities carried out over a period of time. When the findings were evaluated in general, it was found that FC was significantly effective in students' learning, while the effect of DFC on their learning was less effective than FC's. In the emergence of this view in students, FC, and DFC's active role in the student's learning, in general, was effective in the in-class process. Because the most important factor in the use of FC is to ensure the active participation of students in the course and to reduce the time it takes for students to become passive listeners in the classroom (Sletten, 2017). Additional applications and studies in the period not used to explain the subject in the course increase student-instructor interaction and provide students with more opportunities to ask their questions (Jaster, 2017). In addition, students for FC teaching, which includes active learning activities for university students, showed a great deal of positive perceptions and feelings (Jeong, Gonzalez-Gomez, & Canada-Canada, 2016). Therefore, it is consistent with the results of the article, which takes the opinions that FC and DFC are more effective in communicating with the instructor within the scope of the research.

In contrast to the theoretical subject matter of the instructor at FF, students at FC had pre-class videos and had access to the documents shared by the instructor in addition to the course grades that they could take at FF. This is believed to be effective in students choosing FC over FF. Similarly, Mooring, Mitchell, and Burrows (2016) found that FC increases students' access to course materials and brings more time into in-class learning and discussion activities. In DFC, in addition, to live course recordings and lecture notes, students have access to pre-class videos where the course is explained directly, which is much shorter than the live course, and where there is no different situation (such as asking questions) during the lecture. At this point, students at DFC expressed similar views to FC. In addition, the students stated that FC and DFC were effective in their learning. In their assessment between FC and DFC, it was also found that FC was more influential in their learning than DFC. In the Fautch (2015) study, he found that teaching with FC helps students learn on their own.

As a result of the research, students worked on pre-class videos, saying that they came prepared for class and were able to repeat the videos as they wished; they rewinded it and indicated that they could wait. In this respect, it has been found that pre-class videos are effective in their learning. FC includes preparing students before class time and being able to perform interactive studies during class time (Patanwala, Erstad, & Murphy, 2017). With pre-class videos, students have the opportunity to keep their instructors waiting and listening again; courses according to their own speed (Bergmann & Sams, 2012). In this respect, pre-class videos engage students in learning. In a study where FC was implemented by studying a

similar sample prior to the Covid-19 pandemic, it was found that FC contributed to students coming to class prepared (Çoruk, Erdemir, and Seferoğlu, 2020). Therefore, FC and DFC have great potential as an effective application in the learning of students. On the other hand, the study found that two students had trouble focusing and adapting to watch pre-class videos. The most important thing here is that before students can watch the video, the most important factor allows them to start watching the video (Patanwala et al., 2017). At this point, it may be useful to ensure that students come to the course prepared, that the video duration is short, and that the consolidators that provide the videos to work with are addressed. Within the scope of the research, short exams were held at regular intervals and some homework were a continuation of in-class activity. However, students were informed about FC and DFC during the orientation event held at the beginning of the semester. It was determined as a result of the analysis of open-ended responses from the students that there were no students who had trouble adapting among the students who participated in these applications and information, and that one of the two students who participated in the semester with additional placement had trouble adapting.

Compared to FC and DFC, students were found to prefer FC more. This is thought to be due to the fact that the whole process in DFC is remote in the learning process and in FC it is remote and face-to-face. Although in-class studies at DFC take place in the form of live lessons, it can be said that this result is because the previous learning experiences of the students took place face-to-face. On the other hand, students have stated that pre-class videos and content shared in addition to these videos are effective in their learning. However, for live course recordings, some students expressed the view that it was ineffective. This is due to a technical glitch in the Teams platform used for live lessons, resulting in visual problems with live lesson recording for two weeks. There are likely problems caused by the technology used in live lesson recordings. However, external video recording software can be used to solve these problems.

In line with the opinions received from the students, it was concluded that the assignments and practices given in FC and DFC were significantly effective in the learning of the students. Unlike FC in DFC, 3 students stated that homework and applications are ineffective in their learning, and analysis of open-ended responses indicates that students with this view are not adaptable to online learning. Students may have different expectations about learning because they have multiple blended educational activities. It is recommended to investigate the case of in-class activities in some weeks of the DFC process to demonstrate the expectations of the students regarding the learning process, which may be ideal for their learning depending on their experience. Similarly, in-class activities can be held online during some weeks of FC. Thus, the application that may be most suitable for the general population of the students can be determined.

Although FC places more responsibility on students to learn, the ultimate responsibility for students' learning lies with the instructors (Bergmann & Weddell, 2013). Students especially recommend that pre-class videos should be short and interesting (Long, Logan, & Waugh, 2016). Therefore, it is important to plan the courses to be carried out with FC or DFC in a good way. In addition, pre-lesson videos should be well structured and not too long. At this point, in a study of language teaching, videos less than 5 minutes provide higher language proficiency, student participation, and satisfaction than videos between 10-20 minutes; It is stated that similar results were reached in favor of 10-20 minutes with videos between 10-20 minutes and videos longer than 30 minutes (Yu & Gao, 2022). In an FC application performed in a university-level programming course, it was concluded that the students were satisfied with the videos they watched before the course and also liked their in-class discussions (Ronchetti, 2010).

There is a lot of research in the literature about the ERT process that grows with the epidemic process. However, these studies have not found a blended educational practice involving applications such as FC and DFC, and studies examining the current DE process, such as the continuation of ERT. Therefore, it is strongly recommended to carry out research in different disciplines with different examples in this line of work to increase the quality of the blended learning applications in higher education.

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