

## PRESERVICE SECONDARY MATHEMATICS TEACHERS' VIEWS ABOUT DISTANCE EDUCATION IN THE COVID-19 PROCESS

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### ABSTRACT

The purpose of this study was to investigate preservice secondary mathematics teachers' views about distance education that was carried out during Covid-19 process. In this study, phenomenology design was used. The participants of the study were 148 preservice mathematics teachers enrolled in elementary mathematics teaching department of a state university in Turkey. The data were collected with a questionnaire consisting of three open-ended questions developed by the researchers. Content analysis was used in analyzing the data. As a result, the opinions of the preservice teachers regarding the advantages of distance education such as flexibility of time and place, easy access to information, economy, as well as disadvantages such as inefficiency, inequality, lack of communication, and desocialization have emerged. While they thought that general culture and vocational knowledge courses were suitable for distance education, they stated that the field courses were not. It is recommended that the universities should strengthen their distance education infrastructures to create a better distance education process.

**Keywords:** *Covid-19, Distance Education, Preservice Mathematics Teacher*

### INTRODUCTION

Distance education is defined as a form of formal education activity that brings together the students, course sources and teachers by means of interactive telecommunication systems without the necessity of pupils and lecturers being present in the same place (Carswell & Venkatesh, 2002; İşman, 2008). When the history of distance education is examined, it is seen that it has a long-standing background and was managed with different methods throughout the years in line with the developments in technology and that the paradigm of distance education has changed together with the Internet (Clark, 2020).

The physical and geographical obstacles that constitute the foundation of distance education are no longer the sole reason motivating the employment of this education manner and instead it was diversified due to environmental, temporal, technological, psycho-social, and socio-economic reasons (Jacquinot, 1993). When the respective literature is examined, it becomes obvious that distance education is a concept that supports sharing knowledge in lifelong learning and perpetuates the learning activities (Dinevski & Dinevski, 2004; Kırık, 2014). Distance education, along with technological developments, has allowed learning to be individual and at their own pace (Gérin-Lajoie, Papi & Paradis,

2019). Distance training, along with supporting the traditional education processes of individuals, provides individuals with the opportunity to complete their education by providing equal and democratic learning opportunities in the Internet environment in a synchronous and asynchronous manner (Beldarrain, 2006; Maniatis, 2019; Morgan-Klein & Osborne, 2007; Nordin, Embi, & Yunus, 2010; Simonson, Zvacek, & Smaldino, 2019). In addition, it is stated that distance education is a useful method since many people can be provided with education and the opportunity to have a profession or career at the same time (Galusha, 1998; Schneller & Holmberg, 2014). The limitations of distance education are being noted as the ineffectiveness of applied courses, not being appealing to students having less individual learning skills, not being able to solve the learning problems arising from the lack of communication and interaction immediately, and the inability to provide students with a social learning environment (Kaya, 2002; Uşun, 2006). However, in an environment where the whole world is fighting with an epidemic and where there are millions of cases, the importance and necessity of distance education which has time and place flexibility to make educational activities sustainable has come to light.

The World Health Organization declared the COVID-19 epidemic, which affects the entire world as a pandemic on March 11, 2020. Within this context, the decision to conduct distance education has been taken in Turkey and in many countries throughout world. A sharp transition to distance education has caused the teachers and lecturers who had no previous online education experience to be met with numerous challenges (Telli & Altun, 2020). This situation caused many universities to start distance education compulsorily at the undergraduate level during the pandemic process with an unprepared and limited infrastructure (Durak, Çankaya & İzmirli, 2020).

When the studies on distance education are examined, a limitation problem in terms of interaction and communication were identified which are important elements of cognitive learning in learning environments created by means of the distance education method (Aşkar, Dönmez, Kızılıkaya, Çevik & Gültekin, 2005; Serçemeli & Kurnaz, 2020; Uzoğlu, 2017). Besides, distance education often lacks non-verbal communication, which has an important role in creating meaning in communication and understanding messages that are conveyed (Aziz & Dicle, 2017). Furthermore, since the pupils learn in an isolated manner in the distance education process, desocialization increases and motivation deficiencies occur (Galusha, 1998; Paydar & Doğan, 2019). This situation has revealed other roles of the school apart from education services (Anderson, 2020).

Undoubtedly, distance education is a remarkable and effective method for mitigating the formal education that was disrupted in times of crisis such as epidemics. Thus, it is critical to learn about the opinions of preservice mathematics teachers who were studying in the formal education system but completed their studies during the spring semester of the 2019-2020 academic year through distance education. In this direction, it would be useful to determine the quality of education received by preservice teachers, the arrangements, and activities to be made for the sake of making this method of education more significant and eligible, the failed aspects of distance education, and what they expect from distance education. Within this context, the objective of this study is to determine the points of view regarding the advantages and disadvantages of distance education received by preservice secondary mathematics teachers during the process of Covid-19 that is a worldwide problem of the present day in comparison to formal education, the compatibility of mathematics teaching undergraduate program courses of the distance education system, the capability of distance education process and its efficiency.

## METHODOLOGY

### *Research Design*

In this study, phenomenology, which is one of the qualitative research designs, was used. The objective of phenomenology research is to define and interpret the common meaning of the experiences and perceptions of individuals regarding a phenomenon or concept (Creswell, 2013; Yıldırım & Şimşek, 2016). For this reason, phenomenology was chosen as the design of this research in terms of revealing

how preservice mathematics teachers interpret their experiences of distance education during the Covid-19 process and reveal the meanings and perceptions that they attribute to these experiences.

### **Research Participants**

The participants of this research were the preservice teachers who were studying in the elementary mathematics teaching program of a state university in Turkey during the spring semester of the 2019-2020 academic year. The distance education received by the preservice teachers during this process, which coincided with the beginning of the Covid-19 epidemic, were mostly carried out asynchronously by means of slide, video, and document sharing. Besides, the lecturers tried to answer the questions of students in the forums that were opened during the class hours. The preservice teachers participated in the research on a voluntary basis with convenience sampling method. In the convenience sampling method, close-distance and easy-to-contact participants are selected due to speed and practicality to the research (Yıldırım & Şimşek, 2016). The participants that constitute the study group are a total of 148 preservice teachers, 41 of which are freshmen, 46 sophomores, 35 juniors and 26 seniors. 105 of the participants are female while 43 of them are male preservice teachers. Most of the participants were able to access the distance education related to the courses they took through a computer and some through their phones.

### **Data Collection Procedures**

A questionnaire form consisting of three open-ended questions developed by the researchers was used to determine the opinions of participants on distance education during Covid-19 process. The participants answered the questions via a computer environment and sent them to the researchers online. The open-ended questions enabled participants to reflect their own ideas about the phenomenon, subject, and concept intended to be presented and to respond with their own words (Bernard & Ryan, 2010). The first version of the questionnaire form was presented to three experts, including one Turkish education expert and two mathematics education experts. In order to determine whether the questions were clear and understandable, four preservice teachers who were not included in the study were asked to answer the questions. Once the necessary corrections were made, the questionnaire form was finalized. Below is the final form of the questions:

- Question 1: What are the advantages of distance education carried out during the Covid-19 process?*
- Question 2: What are the disadvantages of distance education carried out during the Covid-19 process?*
- Question 3: Which one out of the courses you think are more suitable for distance education during the Covid-19 process?*

Participants were asked to explain their answers with reasons for each question. It was noted that the provision of positive or negative opinions by the participants regarding distance education in an honest and neutral manner is important for the study to achieve its objective.

### **Data Analysis**

The participants were numbered according to their forms before analyzing the data obtained from the research. For example, the preservice teachers studying in the junior year were coded between S1-1 and S1-35, while those studying in the sophomore year were coded and numbered between S2-1 and S2-44. In data analysis, content analysis method was used with the help of NVivo, a qualitative data analysis software. According to Patton (2002), the main purpose of content analysis is to organize and interpret data into meaningful themes or categories. Content analysis is a method that requires in-depth analysis of the data and allows revelation of previously unspecified themes and dimensions (Yıldırım & Şimşek, 2016). Three main themes were formed by considering the three questions asked in the questionnaire which were advantages of distance education, disadvantages of distance education and

the courses that are more suitable for distance education. Under these themes, a pre-code list was created, and the data obtained were coded by the detailed and systematical examination of the answers given to each question by the participants. After the coding stage, some of the codes that were thought to be similar were put together. Then, the frequency of repetition was found for each code under the themes. While presenting the findings, the quotations extracted from the participants' answers were given place to increase the validity of the study. Besides, the results of data analysis were shared with preservice teachers and their opinions were taken to present the researched phenomenon correctly and neutrally (Merriam, 2013). The data was coded individually by two researchers under three primary themes to assure the study's trustworthiness. The agreement among researchers was calculated as 93% using Miles and Huberman's (1994) formula [Reliability=Agreements/(Agreements+Disagreements)]. The researchers came together and reached a consensus among the codes and formed the final version of the coding as presented under the findings.

## FINDINGS

The findings regarding the opinions of preservice secondary mathematics teachers with respect to the distance education during the Covid-19 process are given place under this title.

### ***Findings Regarding the Advantages of Distance Education***

The opinions of preservice teachers on the advantages of distance education carried out during the Covid-19 process were classified under nine different categories: time and place, access to information, economy, individual learning, protection, equality, meaningful learning, easy-to-pass and environmental friendliness. In Figure 1, the categories and the total numbers of participants belonging to these categories are presented in parentheses.

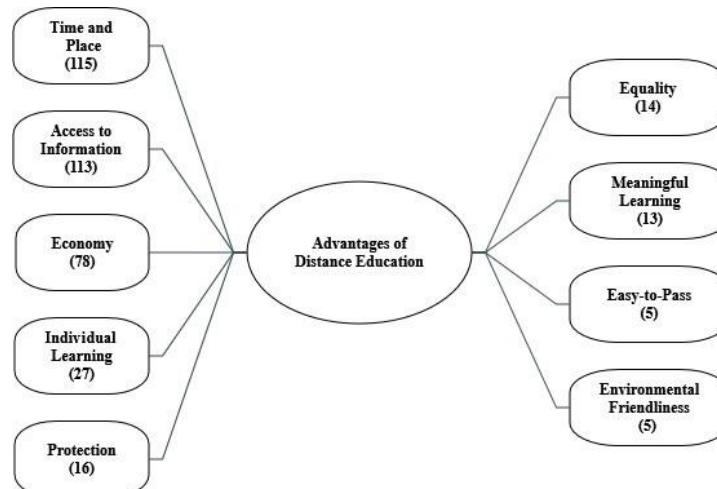


Figure 1. Opinions of Preservice Teachers on the Advantages of Distance Education

As seen in Figure 1, most of the preservice teachers stated that one of the biggest advantages of distance education was the absence of time and place limitations. In this category, the participants talked about the advantages of having the opportunity to listen to the courses whenever and wherever they wish during the distance education process. Some participants stated that the absence of time and place limitations would allow the working people to obtain information in the area they want and convert such knowledge into a certificate. Besides, many participants stated that distance education saves time. Some of the participants argued that they could devote more time to their courses because they did not waste time to commute to and from school or between courses. Furthermore, some participants stated that they were able to listen to the lectures whenever they wanted, so they would not have to rush to

catch up with the course and they would not have to get up early. Moreover, the participants stated that listening to the lectures at home was a great convenience and comfort. In addition, the participants stated that attending many courses in a row in one day in face-to-face education causes tiredness, while in distance education, they listen to the lectures at any time of the day without getting tired since there are no time and place limitations.

Majority of the participants stated that one of the advantages of distance education was easy access to information. The participants said that they provide faster and easier access to information during this process. Many participants argued that they had difficulty in accessing the lecture notes during face-to-face education, and that it was a great advantage to have access to information in distance education. Moreover, the participants stated that easy access to the lecture notes provided them with the opportunity to repeat the topics they missed or had difficulty of understanding. For example, one participant said:

*"Another advantage is that we can watch the lectures that we could not learn and set in our minds, over and over again." (S2-25)*

The participants stated that one of the important advantages of distance education was economy. Since most of the participants carried out the education given in this process with their families, they stated that the absence of expenses such as accommodation, food and transportation provided an economic advantage. Furthermore, some participants said that distance education provided an advantage, as they did not spend money on lecture notes and books. Some of the participants stated that one of the advantages was individual learning. In this category, some participants mentioned the pace of individual learning. For example, one participant said:

*"Those who prefer can study slowly, while others can study fast. In this way, it allows each student to learn at their own learning speed." (S2-25)*

Similarly, some of the preservice teachers stated that distance education offers students the chance to receive education at their own learning speed. Moreover, some of the preservice teachers stated that the ability to learn individually improved during this process. In addition to those who think that individual learning helps improves them in the field of mathematics education during distance education, there are also those who think that they have showed improvement in other areas such as the use of technology and academic research. Some participants argued that one of the advantages was being protected from the disease during the pandemic period. Participants stated that the distance education conducted during this process provided them with the opportunity to feel safe and to continue with their courses by avoiding the risk of disease in the home environment. Some of the participants stated that one of the advantages was equality. In this category, some participants mentioned the equality of opportunity. Within this context, they also mentioned that the distance education allows individuals who have various limitations to conduct formal education to receive education under equal conditions with other individuals. For example, one participant said:

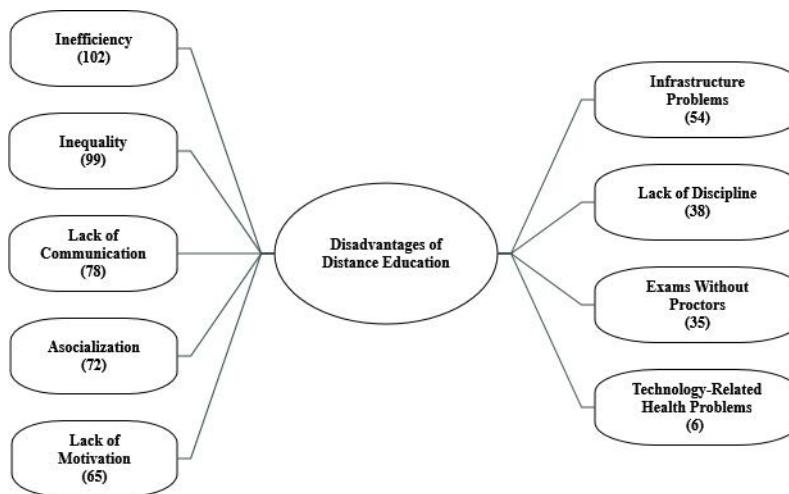
*"Not all students are under equal conditions due to their living conditions or physical disabilities, however, since distance education is conducted via computers, equality is provided to everyone." (S3-11)*

Some participants mentioned that there is no equal learning opportunity in formal education due to the crowded classroom environment, however equal opportunities are offered to everyone without any limitation in distance education. Some of the participants noted that one of the advantages of distance education was the provision of meaningful and permanent learning. These preservice teachers claimed that permanent and meaningful learning takes place in distance education due to the use of various technology-based learning tools, easy access to course materials and being responsible for their own learning. Some participants stated that one of the advantages was that they pass the courses easily because they do not experience exam stress and take the exam in a comfortable environment. Finally, some of the participants noted that one of the advantages of distance education was the reduction of

environmental damage. The participants said that environmentally damaging practices such as the toxic gases emitted from vehicles used for transportation during formal education, the energy spent for heating, the paper and pencils used for exams and course materials are not required in distance education.

### ***Findings Regarding the Disadvantages of Distance Education***

The opinions of the preservice teachers on the disadvantages of distance education conducted during the Covid-19 process were classified under nine different categories: inefficiency, inequality, lack of communication, desocialization, lack of motivation, infrastructure problems, lack of discipline, exams without proctors, and technology-related health problems. In Figure 2, the categories and the total numbers of participants belonging to these categories are presented in parentheses.



*Figure 2. Opinions of Preservice Teachers on the Disadvantages of Distance Education*

As seen in Figure 2, most of the participants stated that one of the most important disadvantages of the distance education was its inefficiency. The participants listed the reasons for the inefficient distance education process as the students are vested in too much responsibility, feedbacks cannot be obtained instantly, and sufficient and qualified course materials cannot be accessed. For example, one participant said:

"Because in most of the courses we only had lecture notes, we tried to teach ourselves. We were able to immediately ask the points we couldn't understand during a course, but it didn't happen that way in distance education." (S1-31)

As stated above, most of the participants mentioned that the course materials loaded into the system were insufficient and that it was difficult to learn the field courses on their own using the documents. Majority of the participants stated that one of the most important disadvantages of distance education was inequality. In this category, the participants mentioned that it was a disadvantage that not all students have equal opportunities to conduct the distance education process. There were those who think that there is inequality in terms of Internet access and technological tools, as well as those who think that there are family-based inequalities. For example, a participant stated:

*"Some of the students or some of the members of their families may have contracted the Covid-19 virus. There may also be students who lost a relative." (S2-15)*

Similarly, some participants mentioned the disadvantages arising from or in connection with the pandemic process such as the illness of themselves or of a relative, their families becoming unemployed, or the inability to provide a suitable environment for distance education in crowded families. Participants stated that one of the leading disadvantages was the lack of communication. The participants discussed the lack of communication in two manners, one with the lecturers and the other among themselves. Most of the participants mentioned that they could not communicate and interact with the lecturer attending the course as much as they used to do in face-to-face education, and that they could not immediately ask about the points that they could not understand and get feedback. Besides, some participants mentioned that the limited communication with their friends in and out of the course was also a disadvantage.

Most of the participants stated that one of the disadvantages of distance education was desocialization. In this category, some participants mentioned that they stayed away from social activities such as art and sports provided in the school environment. Furthermore, the participants mentioned that distance education could not provide a social environment like face-to-face education, and that it gives rise to negative effects such as loneliness, weakening of human relations and lack of competition. For example, one participant said:

*"One of the disadvantages of distance education is reduced socialization. Not being in the same environment with my friends has been bad for my motivation." (S3-14)*

As the participant above stated, many preservice teachers mentioned that one of the disadvantages of distance education was the lack of motivation. The preservice teachers listed the reasons for their lack of motivation were the decrease in socialization and communication, the excessive stimuli at home, the inability to understand the subjects in distance education, the demoralization they experienced during the pandemic process and their concerns for future. For example, a participant stated:

*"We spent so much time at home, and we were bored, and therefore we could not focus on courses." (S2-09)*

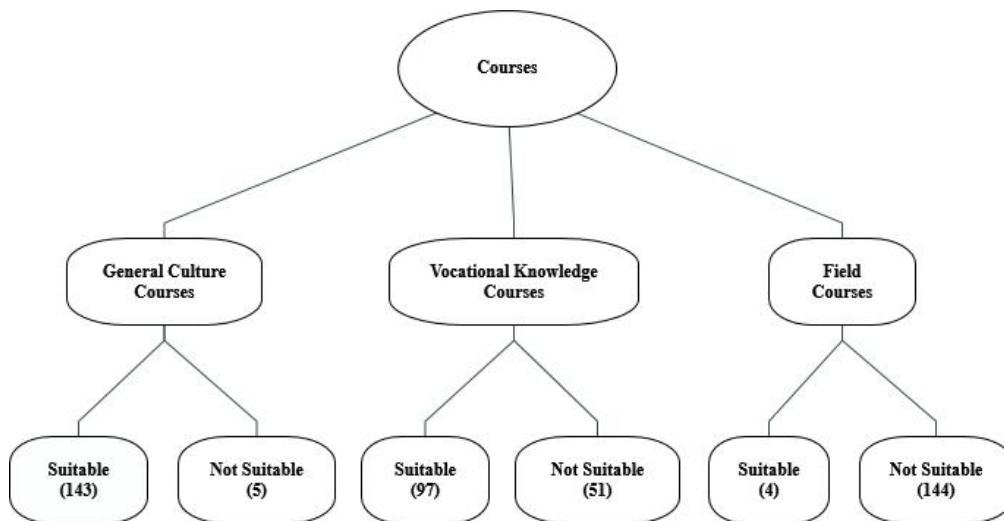
Some of the participants stated that one of the disadvantages of distance education was infrastructural problems. The participants mentioned the infrastructure problems under two main topics; one being Internet access and the other being the problems related to the system used for distance education. Some of the participants stated that they had problems with Internet access due to their geographical location (rural areas) or to power cuts. Some participants, on the other hand, mentioned about the problems such as the interruptions during live courses or forums caused by the distance education system provided by the university, lock-up of the system when too many people login to the system, and the failure to login to the system. Some of the participants stated that lack of discipline was a disadvantage. Participants stated that students who do not have self-discipline have difficulty in planning during this process. Additionally, the participants stated that they did not study the subject week by week due to the lack of discipline and therefore they had difficulty in understanding the accumulated subjects. Some participants stated that one of the disadvantages of distance education was the exams without proctors. Participants mentioned that the probability of cheating increased during online exams as it was conducted without a proctor, and therefore unfair evaluations were made. A participant stated:

*"It is not fair that exams are also remote as well as courses. Although measures have been taken to prevent cheating, I see it as a disadvantage since it is not like the exam environment at school." (S1-01)*

Finally, some of the participants noted that one of the disadvantages of distance education was technology-related health problems. In this category, the participants mentioned health problems such as eye pain, neck and back pain caused by prolonged computer use.

### ***Findings Regarding Courses Suitable for Distance Education***

The opinions of preservice teachers regarding which courses conducted in the Covid-19 process were more suitable for distance education were classified under three categories: general culture courses (Foreign Language, Atatürk's Principles and History of Turkish Revolution, Turkish Language etc.), field courses (Analysis, Abstract Mathematics, etc.) and vocational knowledge courses (Educational Psychology, Assessment and Evaluation, Educational Sociology etc.). The opinions of participants are given in Figure 3 and the total number of participants belonging to these categories are presented in parentheses.



*Figure 3. Opinions of Preservice Teachers Regarding Courses Suitable for Distance Education*

As seen in Figure 3, majority of the participants noted that the general culture courses were suitable for distance education. Participants stated that the most important reason why the courses taught within the scope of general culture courses were suitable for distance education was that they were familiar with the contents of these courses from secondary school and high school education. Besides, they stated that since these courses are generally verbal courses, bilateral communication with the instructor is not very necessary and therefore they do not have difficulty in understanding themselves. Furthermore, the participants stated that they took some of the general culture courses through distance education before the pandemic and did not have any problems. One participant expressed:

"Verbal courses for distance education such as English, History, Turkish are more suitable because I can both read and understand them, and I am familiar with them since high school years." (S1-09)

On the other hand, only five participants expressed opinion that the general culture courses were not suitable for distance education. Participants stated that they could not engage in a bilateral dialog with teachers during the distance education process, as they used to do in formal education, and they were not able to obtain efficiency from the courses they attended.

Most of the participants stated that the vocational knowledge courses were suitable for distance education. Participants stated that they do not need face-to-face communication in vocational knowledge courses, and since these courses are verbal courses, learning occurs when the relevant parts of the course materials or textbooks shared in the system are studied individually. Moreover, participants stated that these courses were generally suitable for distance education in terms of content, as they are usually conducted through presentation or direct instruction in formal education. On the other hand,

some of the participants noted that they thought that the vocational knowledge courses were not suitable for distance education. The participants stated that these courses are directly related to their professional lives, that they are came across the contents of these courses for the first time, there would be both discussion platforms and the lecturer of the respective course would be able to have instant feedback if they were taught face-to-face in the classroom environment; therefore, face-to-face courses would be more efficient. One participant said:

*"We may need the teacher's descriptions, examples and experiences in some subjects, but we have been deprived of them during this time, therefore it is not suitable." (S2-33)*

Only four of the participants stated that their field courses were suitable for distance education. The participants stated that they had to pass on some subjects without fully learning them due to the limited duration of the course in formal education, therefore they had time problems, however in the distance education, they learned more meaningfully as they progressed according to their own learning speed. On the other hand, almost all the participants evaluated the field courses as not suitable for distance education. The participants stated that these courses have abstract content, that they came across some concepts for the first time during the course and therefore the subject became difficult to understand. Besides, they said that progressing on their own at home requires difficult and long-term study. However, they stated that when face-to-face education is conducted in the classroom environment, learning, and interpreting the relevant subject is easier and quicker, and there is an opportunity to have instant feedback for any question or problem.

## DISCUSSION

In this study, the researchers attempted to explore preservice teachers views about the advantages and disadvantages of distance education compared to formal education and the suitability of the courses in the undergraduate mathematics education program for distance education. Participants stated that they mostly consider time and place and access to information as an advantage. Studies showed that the distance education system's time and place independence and access to information are found beneficial by students (Paydar & Doğan, 2019; Pınar & Dönel-Akgül, 2020; Uzoğlu, 2017). The participants emphasized that another advantage of distance education was economy. Similarly, Olcay and Dös (2016) stated that distance education is economical since it reduces costs. Some participants mentioned that distance education supports individual learning and provides meaningful and permanent learning. Distance education allows students to choose learning activities according to their own learning speed, thus personalizing learning (Gérin-Lajoie et al., 2019; Serçmeli & Kurnaz, 2020). Some participants noted that distance education was environment friendly. Similarly, studies emphasized that distance education is environmentally friendly since the opportunity to access resources and exams in digital environments reduces the output costs (Behera, 2013; Solak, Ütebay & Yalçın 2020). Moreover, some participants said that distance education offers students, especially the individuals with physical disabilities, equality of opportunity. Kandemir (2014) argued that, together with the widespread use of distance education, individuals who must work, disabled people, prisoners and women who cannot go to school are provided with education in higher education institutions. To prevent the spread of Covid-19 virus and to protect human health, distance education started all over the world. However, in this study, it was seen that a small number of participants emphasized this benefit of distance education.

Many of the participants stated that the most important disadvantages of distance education were inefficiency since they have difficulty in learning the subjects and inequality arising from the study environment and material insufficiencies. Moreover, the participants stated that they could not establish the communication that is possible in the classroom environment, during this process. Bilgiç and Tüzün (2015) stated that the communication systems should be used effectively in distance education programs, otherwise, students become lonely and out of the system. Some of the participants stated that they became lonely during the distance education process and stayed away from social activities, so one of the disadvantages of this process was asocialization. Participants stated that another disadvantage experienced during this process was lack of discipline. Being away from the school environment and the lack of teacher control encouraged the preservice teachers to behave without

discipline. Görgülü-Arı and Hayır-Kanat (2020) mentioned the benefits of distance education, as well as the problems of students focusing on online courses, and the effects of distance education on reducing socialization. During this process, some participants stated that their motivation decreased day by day as they continued their education in digital environment at home. Studies showed that it was more difficult to motivate students in distance education compared to formal education (Kirmaci & Acar, 2018; Karatepe, Küçükgencay & Peker, 2020). When the studies on distance education were examined, it was seen that the distance education system cannot replace the face-to-face education system (Görgülü-Arı & Hayır-Kanat, 2020; Serçemeli & Kurnaz, 2020). However, in cases of epidemics or natural disasters, undoubtedly the distance education is always a solution to resume an interrupted formal education.

As a result of this study, it may be recommended that the universities should strengthen their distance education infrastructures to create a better distance education process in the future, whereas the teaching staff should communicate with their students and provide the students with live courses, rich content and psychological support and the exams should be carried out in an environment with a proctor in a cameras-on manner.

## CONCLUSION

In summary, the results of the study revealed that preservice teachers consider time and place, easy access to information, economy, individual learning, protection, equality, meaningful learning, easy-to-pass, and environmental friendliness as advantages of distance education carried out during the Covid-19 process. On the other hand, preservice teachers consider inefficiency, inequality, lack of communication, desocialization, lack of motivation, infrastructure problems, lack of discipline, exams without proctors, and technology-related health problems as disadvantages of distance education. Moreover, preservice teachers thought that while the field and field education courses were not suitable for distance education, the vocational knowledge and general culture courses were suitable for distance education.

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