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An Investigation of Preservice Mathematics Teachers' Opinions About Online Education

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Abstract. Due to the Covid-19 pandemic, online education has been an inevitable, new normal for K-12 schools and universities all around the World. Considering that online education is likely to continue as a method of education in the future as well, pre-service teachers should have proper training in this subject. Literature review showed that there are not enough studies on pre-service mathematics teachers' opinions on online education. With this motivation, the aim of this study is to investigate pre-service mathematics teachers' opinions on online education. The multi-case study design of qualitative research methods was employed. The research group determined by purposeful sampling consists of eight volunteer pre-service teachers, who were attending elementary mathematics teacher education program at a state university in the 2019-2020 academic year. The data were obtained from semi-structured pre-interview forms and post-interview forms. Content analysis was used to analyse the data. Consequently, it was found that pre-service teachers' attitudes towards online education differ before and after their application experiences. According to the findings obtained from the pre-interview form applied at the beginning of the study, it can be said that pre-service teachers have an idea about online education, but generally have biases against it. The majority of teachers do not deny the positive aspects of online education, but they think that it cannot or should not replace formal education. However, it was clearly seen that the attitudes of the teachers changed after their online application experience and they were more positive and enthusiastic towards online education.

Keywords. Mathematics education, online education, preservice mathematics teachers

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Learning and teaching approaches have also changed with the innovations and advancements in science and technology that change and develop rapidly in the current century. The fact that the individual and social requirements have also changed with these changes have directly affected the education system. The education system aims to raise individuals with knowledge, skills and behaviours that establish the integrity between values and competencies (Ministry of National Education- (MoNE), 2018, p.4). The spread of information technology has affected every aspectof daily life and changed the ways of working. In addition, advancing technology has allowed us to interact with others effectively and given opportunities to collect, analyse, present and share information. Teaching and learning can, at the moment, be performed in a virtual classroom environment that each participant attends through a direct online connection, instead of being carried out face to face in a classroom environment. E-learning or online education continues to change the way of approaches to teaching and learning.

With the newest advances in digital technologies and the integration of information technology, online education has deeply influenced the presentation of traditional education models. For institutions around the world adapt to these developments, online education, which arouses great interest among researchers, educators, administrators, policymakers, publishers and businesses, has created a very dynamic education environment (Dziuban and Picciano, 2015). Therefore, many institutions have used innovative online education method. For instance, since the 1990s, organisations such as the World Bank, United Nations Educational Scientific and Cultural Organization (UNESCO), and the European Commission have suggested the use of online education to expanding educational opportunities for the disadvantaged groups (Kumar, Kumar, Palvia and Verma, 2017).

Online education is distance education in which the internet is used to create a learning environment where a student interacts with content, teachers and other students to gain knowledge and qualification during the learning process (Moore and Kearsley, 2011). Online education is a flexible teaching presentation system that includes all kinds of learning on the internet. For educators and students, online education allows accessing contents that cannot be found in a traditional classroom environment, and students can receive education on their schedule and at their learning speed (Jones, 2020).

When online education is considered in terms of learners, it becomes increasingly important as an educational tool that can be used effectively to obtain the aims. Perhaps the most crucial

benefit of online education for individuals is that everyone, regardless of their position, has access to education. Online education does not require students to go to school, as it enables students to study efficiently by using an internet-connected computer (Alshamrani, 2019). When most people want to participate in an education program in many instances, they have to live in another city away from their home, family, and friends (Waters, 2012). There are also countries where gender inequality for young women in accessing education (Rosalia, 2014). In such cases, online education helps to remove both social and physical boundaries and barriers. Another advantage of online education is that a student can access easily learning materials from anywhere as long as they have an internet connection (Ippakayala and El-Ocla, 2017). In other words, online education is more acceptable due to its more comfortable and easily accessible feature (Pantic, 2014).

According to Simonson (2010, p. 7), distance education that is at more than 160 years old, dates back to 1833 when a Swedish newspaper advertised the opportunity to study "*Composition through the medium of the Post*". This form of education emerged in England, Germany and then Boston in 1873 and started to be used by institutions. The current forms of online education started in the 1990s by the emergence of the Internet and the World Wide Web and have continued to improve as information and communication technology has advanced and become more complex. Dziuban, Picciano, Graham, and Moskal (2016) describe the evolution of online education in four phases. They are; 1990s (Internet propelled distance education), 2000–2007 (increasing use of Learning Management Systems – LMS), 2008–2012 (growth of Massive Open Online Courses – MOOCs), and beyond with growth of online higher education enrollments outpacing traditional higher education enrollments. Dziuban et al. (2016) describe this period, which is called the fourth wave in the evolution of online education after 2012, as a period that focuses on using new tools and pedagogical models to create an extremely interesting and personalised learning experience for individuals.

Although online education has emerged in a short time like the past thirty years, it has affected all parts of the world very quickly. Especially recently, the Coronavirus (Covid-19) pandemic, which is a problem that concerns all societies, has made radical changes in education systems around the world. In this period, when technological developments are most felt, learning and teaching approaches also experience radical changes. These changes have had a substantial impact on teachers, students and the education system as the stakeholders of education. In this period, online education came into prominence and started to be used actively in almost every country. At this point, new researches have been started in our country, and ongoing studies have

been accelerated. For example, the Education Informatics Network (EIN) (EBA) was used more actively during the Covid-19 pandemic, and teachers and students carried out their education and training processes through live-lessons. This period had a great impact on mathematics education, and it is clear that future mathematics curricula will be shaped within the framework of online education (Mulenga and Marban, 2020).

Curriculums should be a guide for students in keeping up with today's rapidly changing world that we cannot follow. In accordance with this objective, curricula should be characterised to take into consideration technological developments, contemporary innovations and social requirements. Due to it not being possible to continue formal education, especially during the Covid-19 pandemic, changes occur in the implementation of education programs. In this process, online education develops rapidly in our country and in the world, make its impact felt through changes in the education system. Therefore, it is thought that curriculums should be developed to support online education and necessary infrastructure and working should be done. With this in mind, in order to raise individuals who have the qualifications to meet the needs of society, the curriculum should have a structure that can meet the requirements of online education.

Due to the Covid-19 pandemic in our country and the world, online education has been started, and primary education, high schools and universities have continued their education using it since March 2020. Considering that education is likely to be provided online in the future, it is thought that future teachers should also have experience in this subject. For this reason, it is important that the pre-service teacher educated in the faculty of education is trained with experience and competence in this subject before getting to work. As a result of the studies conducted in the literature, it is seen that there are not enough studies on the pre-service mathematics teachers'opinions on online education. Accordingly, the aim of the study was determined as the examination of pre-service mathematics teachers' opinions on online education.

Method

Research Model

In this study, the case study design, which is a qualitative research model, was used. The case study is used in research to identify and see the details of the case, developing possible explanations about a case and to evaluate a case (Gall, Borg, & Gall, 1996). The main purpose of the case study is to understand a case as it is and to make detailed descriptions about this case (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz, & Demirel, 2018). In addition, the case study can present a slice of life

directly to the reader, provides in-depth information about a particular slice of life, and an in-depth examination of unusual cases (Gall et al., 1996). It is considering this fact that the multi-case study design, which is one of the case study types considered to be the most suitable method for this study, was preferred. A multi-case study is a holistic approach to consider each case within itself and then compare these cases with each other (Yıldırım and Şimşek, 2016).

Research Group

The research was conducted by a total of eight volunteer pre-service teachers, (seven female and one male), who were studying in an elementary school mathematics teacher education program at a state university in the spring semester of the 2019-2020 academic year. The study group of the research was determined by purposeful sampling method, which is one of the non-random sampling methods. Since there is no generalisation in qualitative research, non-random sampling methods were used. The purposeful sampling method is that allows the researcher to make an in-depth analysis and to explore and explain the relationships between these cases by selecting the cases within the context of the purpose of the research (Büyüköztürk et al., 2018, p.92-93).

In determining the pre-service teachers by using purposeful sampling method, attention has been paid to select those who can express themselves well and are volunteers. The participants were informed about the aim and process of the research by the researcher before the implementation. After the informing, the permission of the participants was obtained by way of the permission document that includes how the study will be carried out and how long it will take. In the research, the real names of the pre-service teachers were kept secret, and the code names were used. “Aslı, Berna, Ceren, Damla, Işıl, Rüya and Sena” for the female pre-service teacher and “Fatih” for the male pre-service teacher were given as the code names. The data collection tools used in the research were explained in the following section.

Data Collection Tools

The data required to find answers to the research questions were obtained from pre-interview forms and post-interview forms. In the study, a pre-interview form was prepared to investigate pre-service teachers' opinions on online education and their preliminary information on online education and was applied to pre-service teachers at the beginning of the research process. The form includes the positive and negative aspects of online education on mathematics education, pre-service teachers' opinions on online education, and the advantages of online mathematics education.

In addition, this interview forms included questions about whether the pre-service teachers had experience with online education or not.

In the study, the post-interview form was prepared to get the pre-service mathematics teachers' opinions on online education. It was applied to all pre-service teachers at the end of the research process. In this form, pre-service teachers' opinions on their online education experiences, what the application gains about mathematics teaching, and the positive and negative aspects of online education on mathematics teaching were included. In addition, there were questions about pre-service teachers' opinions on preparing online lesson content in the future and their contribution of the process to their professional development.

A pre-interview form was applied in the first week of the research process. Afterwards, a general lesson plan template created according to the 5E (engage, explore, explain, elaborate, evaluate) model was given to pre-service teachers. Pre-service teachers were given two weeks to prepare their lesson plans. After the pre-service teachers submitted their lesson plans, the lesson plans were examined by a researcher and two domain experts, and then feedback and revision suggestions were given to the pre-service teachers. Subsequently, one more week was given to the pre-service teachers to submit the final draft of their lesson plans by making the necessary corrections. Then, the implementation of the lesson plans prepared by the pre-service teacher was completed in one day. After all the pre-service teachers implemented their lesson plans by online, they were given post-interview form and the research process was completed. The data collection process, the preparation and implementation of online lesson plans, and having pre-interview and post-interviews took eight weeks in total. In the study, the interview forms applied to the pre-service teachers have carried out audio and video interviews, and the pre-service teachers' opinions and domain experts' opinions were taken after the application.

In the last week of the research process, online lesson plans were applied. The pre-service teachers prepared and applied their lesson plans by using the material and online program what they wanted in teaching the subject/outcome what they wanted. Each of the lesson plans prepared by the pre-service teachers was implemented online with the participation of 8 pre-service teachers, a researcher and a field expert. In the implementation of the lesson plans, the online program chosen by the pre-service teachers themselves was used and the pre-service teachers were left free to choose the program. The submission date of the lesson plans and implementation day were determined, and eight preservice teachers give an online lecture on the same day.The reason for the

implementation to be carried out in one day is to ensure that the pre-service teacher presents their contents on the same day by preventing them from making changes and make arrangements by being influenced by each other's content and presentation. For the implementation of the lesson plans, each pre-service teacher was given one lesson hour (40 minutes). Next day, the implementation of the online course contents, the post-interview form was applied to the pre-service teachers and the data collection process completed.

Participants were fully informed about the purpose and process of the research before the interviews and ethical rules that would be followed in the data collection and evaluation processes. In the research, data collection tools were applied by taking domain expert opinions. While the interviews and online lectures with the participants are being recorded, the utmost care has been taken to prevent adversely affecting participants. Findings of comprehensive research, which are obtained from lesson plans and presentations, are another research object, and this study includes the findings collected from pre-interviews and post interviews.

Data Analysis

Analysis of the research data was made by content analysis, one of the qualitative data analysis methods, and an analytical approach. Content analysis is defined as a systematic and repeatable technique in which some parts of the content are summarised with smaller content categories with coding based on specific rules, allowing to study indirectly in understanding human behaviour and human nature (Büyüköztürk et al., 2018, p.259).

The purpose of content analysis, which enables to reveal previously unidentified themes and to make an in-depth analysis of research data, is to reach relationships and concepts in which data can be explained (Yıldırım and Şimşek, 2016, p.242). Thematic coding was made by creating codes, sub-themes and themes by way of the data obtained from pre-interview forms and post-interview forms given to pre-service teachers in this study.

The codes were created by using the answers given by the pre-service teachers to the semi-structured questions in the forms. Later, the codes related to each other were brought together and sub-themes were formed. Themes were formed by determining sub-themes related to each other. The data analysis process was done by the researcher and the domain expert. The data obtained from the research were analysed in accordance with the qualitative research method.

In qualitative research, in accordance with the nature of the research, instead of the concepts of " internal validity" and "external validity", the concepts of "credibility" and "transferability" are

being used. Likewise, instead of the concepts of "internal reliability" and "external reliability", the concepts of "consistency" and "verifiability" are being used (Yıldırım & Şimşek, 2016, p.276). With this point of view, in order to ensure the credibility of the research, the degree of serving the purpose and the conceptual appropriateness of the questions in the interview forms used in the research was organized taking into account the opinions and thoughts of the field education experts and so the data collection tools were finalized. To ensure transferability, the criteria of preparation and evaluation of lesson plans, the data obtained from the application of the lesson plans and the online environments where the application was made were described in detail. The findings regarding the experiences and opinions were directly transferred and the quotations of the participants were included. To ensure consistency, the evaluation of the lesson plans and the analysis of the video recordings of the implementation of the lesson plans were interpreted by two different math education experts; and it was observed that the comments of the experts were consistent with the researcher's comments. To ensure verifiability, the data obtained from the interview forms, the lesson plans and the video recordings of and applications by the pre-service teachers were examined in detail without commenting and without distorting the nature of the data, and the results obtained were supported with direct quotations. The reliability of the research was increased by supporting the results of the research with the relevant studies in the literature. While analysing the data, validity and reliability were taken into consideration, and the obtained findings are presented in the following section.

Results

The data of the research obtained from two semi-structured interviews (pre-interviews and post interviews) conducted with pre-service teachers at the beginning and at the end of the study and the researcher's observation notes. In this section, the findings obtained as a result of examining the data collected within the scope of the research are presented.

Results Obtained From the Pre Interview Form

At the beginning of the research process, the findings obtained from the pre-interview form, which was created to understand the pre-service teachers' opinions on online education and their preliminary information about online education, were presented.

When the questions are examined, the pre-service teachers' answers to the question "*Make a general evaluation about online education.*" were examined in three categories as positive, negative and both. The opinions of the pre-service teachers are presented in Table 1.

Table 1.

Pre-Service Teachers' Pre-Application Opinions on Online Education

Theme	Criteria	Pre-service Teachers
Opinions About Online Education	Positive	Aslı, Damla
	Negative	Berna, Ceren, Fatih
	Both	Işıl, Rüya, Sena

As seen in Table 1, three of the pre-service teachers (Berna, Ceren and Fatih) stated negative opinions that they did not find online education efficient, this education could not provide sufficient learning environment and it was not as effective as formal education. The statements of the pre-service teacher, code-named Fatih, who gave negative opinions about online education, are given below.

"*For the first time, there were online courses in the first year (at university). I did not attend too much in those lessons either. I do not find online lessons very efficient because the students can underestimate the lessons and in my opinion, I think face-to-face education is always more efficient.*" [Fatih]

On the other hand, two pre-service teachers (Aslı and Damla) did not mention that online education has any negative effects and stated that it is more beneficial because it saves time and is easily accessible. Example statements of the pre-service teacher code-named Damla, one of the pre-service teachers who gave a positive opinion on online education and noted that almost half of the face-to-face lessons were productive, are given below.

"*I'm excited for myself. I have to prepare a good plan. Maybe we would be more comfortable if we had recorded and shared videos. That's why I'm also a little stressed. But because online education is a lecture that everyone can access from home, I think it is very useful and it has many benefits for the teacher and the student. For example, in schools, approximately 20 minutes of a 40 minute lesson is spent. The remaining time is disrupted somewhat, but there is no waste of time in online education. Therefore, I think it is more useful*." [Damla]

Three pre-service teachers (Işıl, Rüya and Sena) stated that online education is very useful and necessary, but it should be done in compulsory situations such as the pandemic period, it should not replace formal education and should be given in order to support formal education. The statements

of the pre-service teachers, Işıl and Sena, who stated the positive and negative aspects of online education, are given below.

"*When there is the necessary infrastructure, it is actually very good at one point compared to face-to-face training. Because it will not be like getting ready and going to school, it can be useful in terms of time. However, the bad aspects far outweigh. There is no socialisation, you cannot feel the atmosphere in the classroom environment, when you get feedback and its efficiency is not like in face-to-face training. You can learn academic knowledge, but you are only improving cognitively. Communication is limited. The environment in online education is not as warm as that in the classroom. In my opinion, necessary and appropriate online education would be much better than continuing online education. Because it makes us asocial. Since the one thing we learn is academic knowledge, it creates an important problem in versatile development. In other words, as I said, very good results can be obtained when it is given that is required and most appropriately.*" [Işıl]

"*Online education is an indispensable resource for today's difficult times. It could not be adapted because it became compulsory to transition, but I think it is an efficient platform when sufficient preparation and preliminary work is done. Since today is the technological era, many things can be put on traditional education. Of course, it has negative aspects. The student has trouble focusing at the beginning of the lesson or there may be setbacks due to the environment. As such, the student can miss the lesson. Online education should be used, but it should not be the only option.*" [Sena]

The findings obtained from the pre-service teachers' answers to the question "*Have you had online education experience before? If yes; Please advise which lesson/class/subject.*"were presented in Table 2.

Table 2.

Online Education Experiences of Pre-Service Teachers

Theme	**Experience**	**When**	**Pre-service Teachers**
Experience in Online Education	Yes	Pandemi Period	Berna, Sena
		Pre-Pandemi Period	Ceren, Fatih, Işıl
	No	---	Aslı, Damla, Rüya

As seen in Table 2, while five of the pre-service teachers (Berna, Ceren, Fatih, Işıl and Sena) answered yes to this question given in the form, the other three participants said no. Two of the five pre-service teachers (Berna and Sena) with online education experience had compulsory online education experience during the current pandemic period. The other three pre-service teachers had online education experience in English and Ataturk's Principles and History of the Revolution lessons in the first year of the university. Example responses of preservice teachers are given below.

"*Yes, we received online education in English and Atatürk's Principles and History of the Revolution lessons, which are common lessons in the first year of the university. Nowadays, private teaching institution lessons are carried out in this way.*" [Işıl]

"*I have just experienced it. I take it in all KPSS lessons. Likewise, I attended my university online lessons. I experienced it in the fourth year of university. I received lessons; creative drama, differential equations, training and analytical geometry through online education.*" [Sena]

The pre-service teachers' answers to the third question "*What do you think about online math education?*"were examined in three categories as positive, negative and both. The opinions of the pre-service teachers are presented in Table 3.

Table 3.

Pre-Service Teachers' Opinions on Online Mathematics Education

Theme	**Criteria**	**Pre-service Teachers**
Opinions About Online Mathematics Education	Positive	Damla
	Negative	Berna, Ceren, Fatih, Işıl
	Both	Aslı, Rüya, Sena

As seen in Table 3, while seven of the pre-service teachers stated negative opinions about online mathematics education, one pre-service teacher (Damla) mentioned only the positive aspects to this question. Damla believes that in online mathematics education, one-on-one communication can be established with the teacher without being affected by the environment, education continues without interruption regardless of the conditions, and it can be more efficient than formal education. The statements of the pre-service teacher named Damla code are given below.

"*It is a very frequently used training-style today. For example, we cannot receive face-to-face training due to our health problems. Private teaching institutions and some teachers prepare us for*

the exam through online education. We can listen to lessons regardless of the conditions, and sometimes this can be more efficient than the lessons we have taken in the classroom. You can ask the teacher any question you want without being affected by anyone but you may not be able to ask everything on your mind in the classroom. Thus, it can be considered a solution to a lack of self-confidence. In the future, maybe the education system can continue in this way." [Damla]

The negative opinions are that online mathematics education is a difficult process, it is not as efficient and effective as formal education, it is difficult to get feedback, it can reduce the success in mathematics lessons, and the necessary importance will not be given to the lesson because the teacher is far from the environment. Example statements of pre-service teacher code-named Fatih, one of the pre-service teachers who expressed a negative opinion, are given below.

"*I don't think very positive things about online education in general. In a lesson where you can be successful by following the lesson like mathematics and taking your notes regularly, I think that online education reduces success. In online education, students may not know what to note. Since the teacher is not directly in the environment, they may not give the necessary importance to the lessons.*" [Fatih]

In addition, three of the pre-service teachers who gave negative opinions (Aslı, Rüya, and Sena) stated that online education can become compulsory in the future as it is now and also mentioned its positive aspects. Example statements of the pre-service teacher code-named Aslı are given below.

"*Actually it's a difficult process. It may not be as efficient as face-to-face training. Getting feedback can be a bit troublesome. But it will be an experience for us. In the future, we may have to do online education as is now.*" [Aslı]

Results Obtained From the Post Interview Form

In this section, at the end of the research process, the findings obtained from the last interview form, which was created in order to get the pre-service teachers' opinions on online education after lesson plan preparation and application experiences are presented.

When the questions are examined, in the question given as "*Make a general evaluation about your lesson plan content preparation experiences.*" the answers given by the preservice teachers were examined.

The pre-service teachers' answers to the question "*Make a general assessment of your experiences in preparing online course content.*" were examined in the context of their positive and negative opinions about their experiences and their opinions about online teaching processes. The opinions of the pre-service teachers are presented in Table 4.

Table 4.

Pre-Service Teachers' Opinions on Online Education Experiences

Theme	**Experience**	**Opinion**	**Pre-service Teachers**
Evaluation About Online Lesson Plan Preparation Experiences	Positive	Prejudice	Aslı,
		Worry and anxiety	Ceren, Damla, Işıl, Rüya
		Excitement during the lesson	Berna, Damla, Fatih
		Hardship since it's the first experience	Berna, Rüya, Sena
	Negative	---	---

As seen in Table 4, there was no pre-service teacher who stated any negative opinion about their experience. The pre-service teachers stated that they were worried at first because they were going to have such an experience for the first time, and they did not know how to do it and what to do it, they had a little difficulty in preparing an online lesson plan, but this experience contributed a lot to them. In addition, the pre-service teachers stated that the revision suggestions given to them regarding the lesson plans helped them in developing the online lesson plans. Example expressions chosen among the answers given by the pre-service teachers are given below.

"*Obviously, first of all, I was very worried about preparing online lesson content for this lesson. Because I was in a very dilemma about what to do, how to do it. I was very worried about what I did and did not do right about my lesson content plans. Fortunately, thanks to the feedback provided to me, I learnt how I can make my corrections. Actually, I say I am very glad I had this experience. It has contributed so much to me that I fully believe that I will benefit from it while practising my profession. Fortunately, our teachers offered us this opportunity.*" [Işıl]

"*It was the first time I prepared a lesson plan, and this was my first experience related to online education. So I had a little difficulty. But it was a great advantage for us to experience online education in this way, which is a requirement of today's conditions. We had the opportunity to compare the challenges of online education with traditional education. In terms of content, we were able to present the activities that we could not apply in the classroom environment.*" [Sena]

The pre-service teachers' answers to the question "*What do you think about preparing online lesson content on different topics/achievements in the future? Please explain.*" were examined in three categories as preparing voluntarily, preparing to support face-to-face education and preparing in case of obligation. The opinions of the pre-service teachers are presented in Table 5.

Table 5.

Pre-Service Teachers' Opinions on Online Lesson Plan Preparation in The Future

Theme	**Criteria**	**Pre-service Teacher**
Willingness to Prepare an Online Lesson Plan in The Future	Preparing voluntarily	Ceren, Damla, Fatih, Sena
	Preparing to support face-to-face education	Aslı, Işıl
	Preparing in case of obligation	Berna, Rüya,

As seen in Table 5, all of the pre-service teachers stated that they want to prepare online lesson content in the future, or they will gladly do it if they have to. In addition, Aslı and Işıl stated that face-to-face training can be done to make a difference, Berna stated that it is more exhausting but more effective than face-to-face training. Ceren stated that she aims to discover different materials that can emphasise other lessons while teaching mathematics, and Fatih stated that he can use the contents prepared by her friends. Example expressions chosen among the answers given by the pre-service teachers are given below.

"*I think the process is more exhausting than face-to-face training, but I don't have a negative reaction to online lessons. Face-to-face education is more effective, but I will gladly prepare online lesson content if the training is given online due to the conditions as is now.*" [Berna]

"*I can use some of the lesson contents prepared by my friends. For example, it was different and interesting to explain the subject of clusters using the map, and the percentages problems, too. Therefore, in online education, lesson content can be prepared in different subjects or achievements and I would like to do this.*" [Fatih]

The pre-service teachers' answers to the question "*If you were to give online education in the future, do you see yourself proficient? What do you think about the contribution of this process to your professional development? Please explain.*" were examined in two categories as proficient and not proficient. The opinions of the pre-service teachers are presented in Table 6.

Table 6.

Pre-Service Teachers' Opinions on Online Education Self-Proficiency

Theme	Criterions	Pre-service Teacher
Perception of Self- Proficiency in Giving Online Education	Proficient	Aslı, Ceren, Damla
	Not proficient	Berna, Işıl, Fatih, Rüya, Sena

As seen in Table 6; Aslı, Ceren, Damla and Rüya stated that they saw themselves as competent in online education, while other pre-service teachers stated that they do not see themselves as competent for now. However, all teacher candidates stated that this experience they had positive contributions to them. Ceren stated that this process contributed to discovering and using some of its features and that it created many new ideas that could be applied both in the classroom and online education. Rüya stated that she learned how to prepare lesson content in this process and that she was preparing it for both online and formal education. Fatih, one of the pre-service teachers who did not see himself as competent, stated that if he could practice more, it would be better. Parallel to Fatih, Işıl stated that more experiences will help to improve herself on online education so that she can reach more students. Sena stated that she will improve herself with the experiences she has gained in this process, that having this experience is beneficial in terms of seeing her shortcomings and that it helps her to gain new ideas by seeing the experience of her friends, that she realises that she cannot manage time, therefore she will develop herself in time management and will discover new applications to use in online education.

"I do not see myself in this competence for now. Because I'm at the very beginning of the road. I have experienced it once until now. The more I experience, the more I will be enough. I intend to improve myself on online education. In this way, not only can I reach my school in Turkey even though students are at the other end and I can help more students. This would make me really happy." [Işıl]

"I don't see sufficient for now. But I will improve myself by gain experiences during this process. Online education has become common nowadays due to obligation. Perhaps this method will be preferred in some subjects in the future. Therefore, it was useful to gain this experience in terms of feeling my shortcomings. It also helped me to get new ideas by seeing my friends' experience. I realised that I was not able to manage time in the lesson. Thus, I will improve myself

in time management and pay sufficient attention to this while re-preparing online courses. I will discover new applications to use in online education." [Sena]

Discussion And Conclusion

In this part of the research, the results get from the findings regarding the research problem, discussions and suggestions based on the research results are presented.

Pre-service teachers' attitudes towards online education differ before and after their application experiences. According to the findings obtained from the pre-interview form applied at the beginning of the study, it can be said that pre-service teachers have an idea about online education, but generally have biases against online education. The majority of pre-service teachers do not deny the positive aspects and facilities of online education, but they have the opinion that it cannot or should not replace formal education. However, it is clearly seen that the attitudes of the pre-service teachers changed after their online lesson content application experience and they were more positive and enthusiastic towards online education. According to the results of the study conducted on faculty members in the literature, they have online education experience exhibited a positive attitude towards online education and those who did not have a negative attitude (Adnan & Boz, 2015; Gürer et al., 2016). At the same time, other studies in the literature reveal a negative relationship between attitude towards online education and online education experience (Alshangeeti, Alsaghier, & Nguyen, 2012; Lloyd, Byrne, & McCoy, 2012; Manderbachvd., 2012). In addition, due to the Covid-19 pandemic recently, on the transition to online education across the country, it was found that different branch pre-service teachers have a negative attitude towards the online education in a study (Karatepe et al., 2020).

Similarly, according to the results of the study conducted by Yalman and Kutluca (2013), pre-service teachers think that online education is not as effective as face-to-face training. In the study conducted by Barış (2015) on undergraduate students, it was concluded that attitudes of undergraduate students towards online education were low, and in Tuncer and Bahadır's (2017) study, students had a negative opinion towards online education. According to the results of this study, it can be concluded that students have had a negative attitude towards online education, in line with the results in the literature review, but their opinions changed positively after their online education experience. In the study, it was seen that while half of the pre-service teachers saw themselves as competent to provide online education, the others had the opposite opinion. In addition, all pre-service teachers stated that the process contributed positively to them. In parallel

with this result, Karatepe et al. (2020), it was concluded that among all departments, pre-service mathematics teachers at least consider themselves competent in providing online education and think that online education is the future of education. It is concluded that the aspects deemed inadequate or negative opinions of the pre-service teachers for implementation are mostly technical problems arising from the use of the program or online environment. It is clearly seen that this situation negatively affects the lesson process and the teachers' opinions on the application. During online education, pedagogical and technical support provided to teachers, their satisfaction and performance of online education can be increased (Gürer, Tekinarslan, & Yavuzalp, 2016; Lloyd, Byrne, & McCoy, 2012).

The pre-service teachers stated that they want to provide online education in the future and that they will gladly do so if they need to provide online education. It was observed that none of the pre-service teachers gave a negative opinion on this issue. From here, it can be concluded that the pre-service teachers were satisfied after their online lesson content preparation and lecture experiences and would like to experience. While this result is in line with the result of the study by Yıldız (2011) that pre-service teachers stated that use of online education would increase in the future and they would recommend it to their colleagues, in the study conducted by Karatepe, Küçükgençay and Peker (2020), pre-service teachers were reluctant to provide online education in the future.

Recommendations

According to the findings obtained in this study, it is recommended to provide training to educators, the pre-service teacher educated in the faculty of education, about the use of online education programs, possible problems and solutions. In addition, pre-service teachers can be graduated competent to prepare content and teach in online education. For researchers, it is recommended to carry out a similar study on mathematics teachers. Within the scope of this research, similar studies can be conducted in which the lesson plans prepared in the online environment are applied to middle school students, and their opinions are taken.

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Conflict of Interest

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Ethical Standards

We have carried out the research within the framework of the Helsinki Declaration.

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