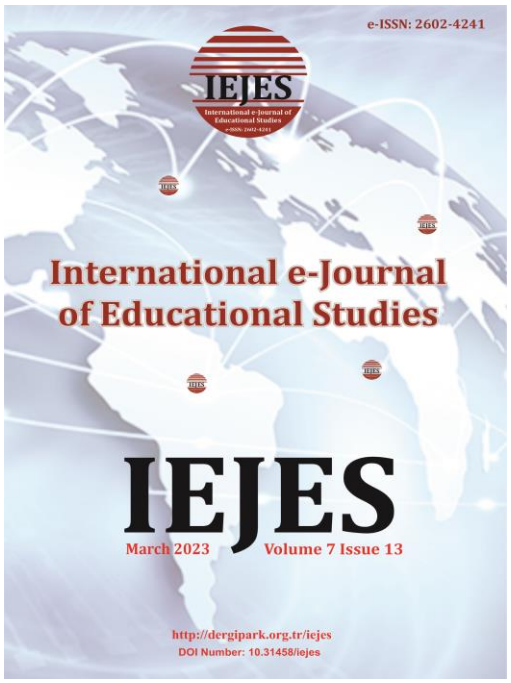

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Abstract

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Research Article

Experiences of Pre-Service Science Teachers in "Teaching Practice" During the Covid-19 Pandemic*

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Abstract

The study was carried out the case study method under the category of descriptive research approaches. A purposeful sampling method was used in the study because it allows in-depth research by selecting rich situations. Semi-structured interviews and semi-structured observation forms were used as data collection tools. Interviews are preferred in the research process because they provide the opportunity to analyze the situation in depth with flexible questions as well as questions directed to discover the richness of the schemas in the brain of individuals. Observations have been preferred because they allow the examination of human behavior in natural environments. In this research, the content analysis method was used in which the existence of codes in the qualitative data obtained during the analysis process was determined, themes were formed by combining these codes, and inferences were made. The analysis of the research findings, it was determined that the majority of pre-service science teachers associated the concept of distance education with the 'problem'. When it is explained that the pre-service science teachers will conduct the 'teaching practice' course with distance education during the COVID-19 pandemic process, their emotional state, anxiety, fear, curiosity, and sadness. As a result of the research, "Various projects can be developed to improve the existing infrastructure and provide more infrastructure support to prospective science teachers and schools, especially science teachers, within the framework of distance education and educational technologies. In this way, universities, schools, teachers, students, and parents are a stakeholder in educational technologies.

Keywords: Pre-service science teachers, teaching practice, covid-19

1. INTRODUCTION

As of December 2019, a virus that has radically affected and changed the world (Huang, et al., 2020), has become the center of life, starting from central China, and spreading all over the world. The epidemic caused by the effect of the virus has been defined as a "pandemic" by the World Health Organization (World Health Organization, 2020). From this definition, it would be quite appropriate to say that all our habits have changed and evolved into a process of innovation full of differences. The education system is one of the areas that are greatly affected by these innovations (Sá & Serpa, 2020). As a matter of fact, considering the sample of Turkey, as of March 13, 2020, all levels of the education process have suspended face-to-face education. After the interruption of face-to-face education, various structuring and training studies started to be carried out. At primary and secondary school levels, GSM operators have 8 GB internet usage rights agreements (Ministry of National Education of Turkey [MNET], 2020a). By using 3 EBA TV channels (EBA TV Primary School, EBA TV Middle

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School and EBA TV High School) (MNET, 2020b), it was tried to ensure that education was not interrupted. At the university level, this process; is shaped by activities such as online lectures, course content videos and recording of lectures, and conducting assessments and evaluations (Higher Education Institution, 2021) using homework, project, or online exam methods. With the effect of the pandemic, many countries such as Turkey have directed various practices in their educational activities. Some countries and examples are given in Figure 1.

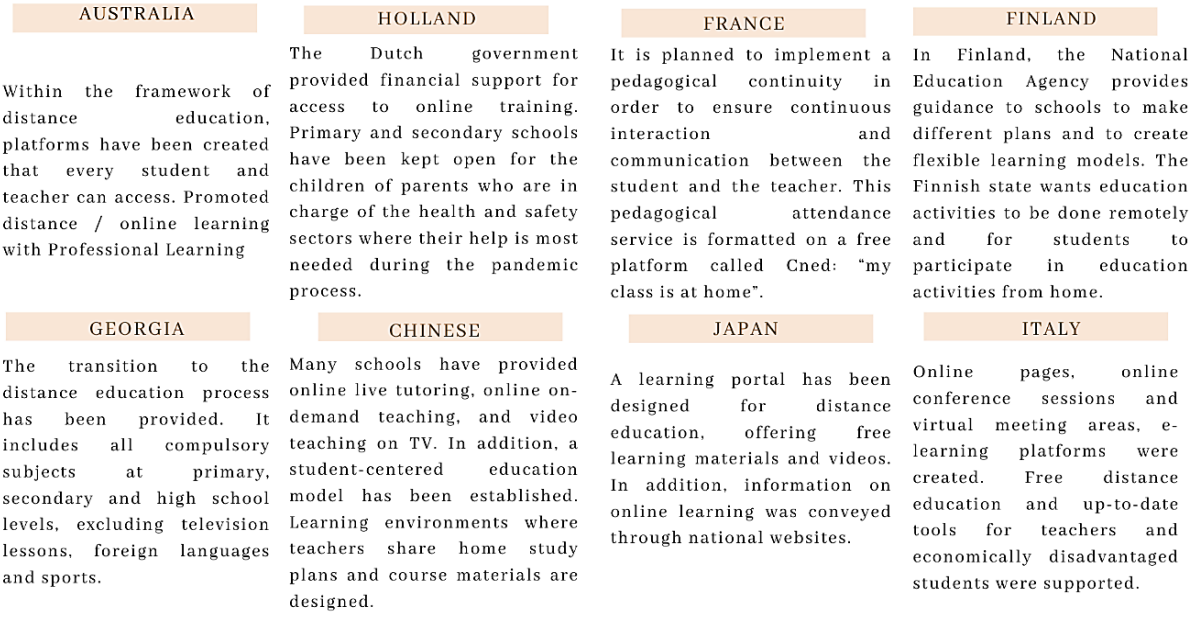

Figure 1. Educational activities of some countries in the pandemic (Reimers & Schleicher, 2020**)**

As can be seen in Figure 1, the concept of "distance education" has come to the fore with the pandemic's effect in almost most countries, including Turkey. Training carried out in planned and online environments is called distance education (Hodges, Moore, Lockee, Trust & Bond, 2020). In other words, distance education is the conduct of courses (Usun, 2006) within a certain program in which learners and teachers are together in online environments, based on virtual hereness principles, in communication and face-to-face teaching activities. Although the concept of distance education has not entered our lives during the COVID-19 process, it can be said that it has provided its permanence with the pandemic (Giannini & Lewis, 2020). It is an important factor in preferring the fact that it does not require the student and the teacher to come to the same environment and does not require transportation fees in addition to saving time (Davis, Gough &Taylor, 2019) and that it is student-centered because it appeals to various sensory organs, that it has a widespread impact by reaching a wide student body and that it is effective in terms of offering equal opportunities to students. It should be taken into consideration that distance education aims to create a new educational environment, integrate work and teaching, ensure lifelong learning, and integrate information technologies into the educational process (Cavanaugh, 2001). Having all these advantages has ensured that distance education has existed for a long time in the education process, distance education activities have been carried out in places, but with the COVID-19 pandemic process and health in mind, even "theoretical" courses as well as "applied" courses have been carried out through distance education. Therefore, the "teaching practice" courses carried out in the faculties of education have also been processed by distance education. Teaching practice involves the lessons which each pre-service teacher teaching experiences most actively (Cohen, Hoz & Kaplan, 2013), and the pre-service teachers prepare for the profession by linking theory and practice (Greve, Weber, Brandes & Maier, 2020), the selection and application of methods and techniques, classroom management, instructional technologies, and

material design, and a process through which they can apply their knowledge of assessment and evaluation (Krzywacki, 2009).

The practice of teaching is seen as one of the most important components of teacher education programs as it acts as a bridge in undergraduate education since the pre-service teachers can experience the information they have learned in daily life and realize their implementations (Greve et al., 2020). This course, which is given to ensure that pre-service teachers are prepared in the best way for the teaching profession, aims to have the competence to use the knowledge, attitudes, skills, and behaviors related to the teaching profession gained by the pre-service teachers during their education in the educational environment (Lin, 2020). Therefore, in most teacher training programs, long-term teaching practices or internships are carried out (Hascher & De Zordo, 2015). The fact that the teaching practice process is carried out remotely within the scope of the pandemic can be described as a critical period. Obtaining detailed data covering the whole process such as the perspectives, attitudes, methods, and techniques of the pre-service teachers about this process, classroom management, etc. have great value in eliminating the problems that may occur in the future. For this reason, it is foreseen that researchers will turn to research that defines the process of "pandemic" and "teaching practice". During the pandemic period, opinions were determined with various sample groups related to distance education (Davis et al., 2019). Additionally, there are studies examining various variables related to teaching practice (Cohen et al., 2013; Greve et al., 2020; Güneş & Kaya, 2022; Uzun & Koparan, 2021). However, during the COVID-19 pandemic period, the sparse research that considers the activities and perspectives of pre-service teachers holistically in the "teaching practice" process carried out by distance education has emerged. In addition, it portends that the course process, which is integrated with the context of "hands-on activities" and daily life contexts based on practice activities such as science teaching, will be a research that will contribute to the literature of the depiction of the "teaching practice" course activities of the pre-service teachers. For this reason, this research is aimed to determine the perspectives and course activities of pre-service science teachers within the scope of the "teaching practice" course during the COVID-19 pandemic process.

1.1. Distance Education

Distance education has been defined as a form of education made from a certain center by using various communication tools without being face-to-face between the student and the teacher (Mshvidobadze & Gogoladze, 2012). It is also expressed as a comprehensive learning process supported by new communication technologies and carried out in a planned manner. Provides education and training opportunities to people with systems that can keep up with the developing technology and contribute to human education without being affected by time and space by removing the time and geographical barriers that disrupt education. In another definition, it is explained as an education system where teachers and students in different places meet by using information technologies, in a planned way, by an institution that has the right to issue official documents such as diplomas or certificates.

It is accepted that the first organized attempt in the field of distance education was made in the Langenscheid language school in 1956. Then, distance education was used by Rustinches Distance Education School in university entrance exams in Germany (Mastan, Sensuse, Suryono & Kautsarina, 2022). Australia was the first country to implement distance education in primary and secondary education. Distance education applications in New Zealand were started in 1922 at the New Zealand Letter Teaching School. To provide students who attend night courses in Poland, with learning opportunities from television, experimental distance education studies were started between 1966-1968. In Spain, the National Distance Education University was established in 1972 and this university started education in 1973 (Abuhammad, 2020). Developments in the field of information and communication technologies have increased the interest in distance education together with large

commercial enterprises. Partnerships established by universities with companies such as Caliber Learning Network, AT&T Learning Network, and MCI Communication in the USA have led to the development of a new understanding of distance education together with teaching models. Education lessons are given via satellite, video conference, and computer. Kentucky Virtual University, Western Governors University, Pennsylvania, and South Carolina Universities, which were established in the USA in 1997, can be specified as a few of the educational institutions that provide distance education (Chen, Kaczmarek & Ohyama, 2021). Some institutions in the UK, such as the "United Kingdom Open University", have re-established themselves as virtual universities. There are institutions that use both physical and virtual environments, called dual or mixed mode, as well as institutions that provide only network-based education such as "The University of the Highlands and Islands" (Churiyah, Sholikhan, Filianti & Sakdiyyah, 2020). Distance education has emerged in parallel with the technological developments and changes in time and the change in human needs and has taken its current form by constantly updating its existence. Although distance education has a dynamic character, it constantly renews itself and maintains its existence in line with the requirements of the age.

Distance education offers the opportunity to learn for people who cannot continue face-to-face education due to time, age, and socioeconomic reasons. With distance education, individuals have the opportunity to progress according to their own learning speed. Due to these features, distance education is an educational application that provides a lot of convenience to the learner and is easy to implement (Alea, Fabrea, Roldan & Farooqi, 2020; Erdemci & Elçiçek, 2022). The importance of distance education, which emerged with the end of the fact that education can only be done in school buildings, was better understood during the COVID-19 pandemic. With the closure of schools due to the pandemic, face-to-face education was interrupted, and online education was started. Thanks to distance education, the subjects in the curriculum were explained to the students with various applications (ZOOM, Teamlink, Skype, and Google Meet). The implementations prepared for the teachers and students to come together on a common platform to carry out their lessons, for the students to gain the achievements of the academic year, have enabled the teachers to improve themselves in the use of technology in the distance education process. Teachers who lacked information about technology literacy had difficulties in courses conducted over ZOOM and had problems with technology and communication (Iwai, 2020). Students and teachers who started the distance education process suddenly experienced anxiety due to their lack of experience in distance education (Allam, Hassan, Mohideen, Ramlan & Kamal, 2020). However, teachers should be able to use the word, pdf, and PowerPoint applications at a simple level, and be able to start and end the lesson and control the lesson process in online courses. The distance education process has created a step for students and teachers to see their technological deficiencies and to improve themselves technologically by eliminating these deficiencies. On the other hand, distance education provides the opportunity to repeat. The fact that it provides various opportunities in terms of facilitating students' learning shows that distance education is sustainable (Bakirci, Ozcan & Kara, 2021; Karakaya-Cirit & Aydemir, 2020). In line with the developments and changes in technology, houses can be turned into small libraries by using individual facilities.

1.2. Distance Education Applications in the Covid-19 Pandemic in Turkey

Since the epidemic that affected the world started in our country, various measures were taken to protect the health of students, teachers, and parents and to ensure that students do not break away from the education process. For primary and secondary school students in Turkey, distance education has been started by the Ministry of Education between 23 March-29 June 2020 over the Education Informatics Network (EBA) and TRT, and EBA TV primary, secondary and pre-school channels. In the "MONE 2020 Administrative Activity Report", distance education activities carried out to ensure

the continuity of education during the COVID-19 pandemic period were published. To provide uninterrupted access to distance education, free access to EBA up to 8 GB was provided via mobile networks. 14 267 EBA support points and 164 Mobile EBA support points have been established for students who are in rural areas and have transportation problems. More than 500 thousand tablets with GSM internet usage rights up to 25 GB were distributed to disadvantaged students.

2. METHOD

2.1. Research Model

The study was carried out by determining the case study method under the category of descriptive research approaches. The reason why the case study method was chosen within the scope of the research is that the method uses multiple sources of information about a situation or an event (McMillan & Schumacher, 2010) and allows the process to be examined and described in depth (Creswell & Poth, 2016). The most appropriate method was the case study to reveal the experiences of the pre-service teachers in this process in detail and to find answers to the questions of what, how, and why.

2.2. Participants

In the study, the purposeful sampling method was used because it allows in-depth research by selecting rich situations. Purposeful sampling is a widely used technique for the most efficient use of limited resources (Palinkas et al., 2015). Saturation, which is given importance in qualitative research, is defined as the continuation of purposeful sampling methods until no different data is obtained from the research (Gentles, Charles, Ploeg & McKibbon, 2015). As can be seen, the size of the sample differs according to the purpose of the study and the available sources (Dongre, Deshmukh, Kalaiselvan & Upadhyaya, 2010). In the selection of the participants by purposive sampling method, it was taken into account that they were fourth-grade students, they were taking the teaching practice course from the same advisor, they could attend weekly evaluation meetings and they were volunteers. At the same time, the focus of the research and the principles of data amount were taken into consideration in determining the sample size. The demographic information of the participants is presented in Table 1.

Table 1. Demographic information of participants

Code Names	Gender	Grade Level	Grade Point Average
T01	Female	4th Grade	2,50 – 3,00
T02	Female	4th Grade	2,50 – 3,00
T03	Female	4th Grade	2,50 – 3,00
T04	Female	4th Grade	3,00 and up
T05	Male	4th Grade	2,50 – 3,00
T06	Male	4th Grade	2,50 – 3,00
T07	Male	4th Grade	2,50 – 3,00
T08	Male	4th Grade	3,00 and up

When Table 1 is examined, the participants were coded as T01, T02, … and T08; a total of four participants were female and four participants were male, and a total of six participants' grade point averages were 2,50 – 3,00 and a total of two participants' grade point average were 3,00 and up.

2.3. Data Collection Tool

Semi-structured interviews and semi-structured observation forms were used in the data collection process. Interviews are preferred in the research process is that they provide the opportunity to analyze the situation in depth with questions that are flexible and can be shaped according to the speaking situation, as well as the questions directed to discover the richness of the schemas that exist in the brain of individuals (Milles & Huberman, 1994). Therefore, the interviews are conducted in a semi-structured manner that offers the opportunity to add to the questions, to change the location of the questions according to the priority status, and to make detailed explanations regarding the questions by the research conditions (Neuman, 2012). Observational work is done in natural environments and allows the study of human behavior. The observation form can describe the observed feature at different levels and allows seeing how often and at what rate the performances are met (Gillham, 2000). The use of observation forms in the professional development of teachers is an accepted method. Observations are carried out to collect information about the environment, event, or individuals to be evaluated in detail (Tashakkori & Teddie, 2003).

The questions asked to the participants within the scope of the research are as follows:

1. What do you think about the concept of distance education?
2. What are your feelings about the concept of distance education?
3. What do you think about the concept of "teacher" in distance education?
4. What are the problems you encounter in distance education?
5. What are the preferred teaching methods in distance education?
6. What are the preferred teaching activities in distance education?
7. What do you think about the implementation and management process in distance education?

2.4. Data Collection Process

The research process was carried out in 6 steps. These six digits are presented as follows;

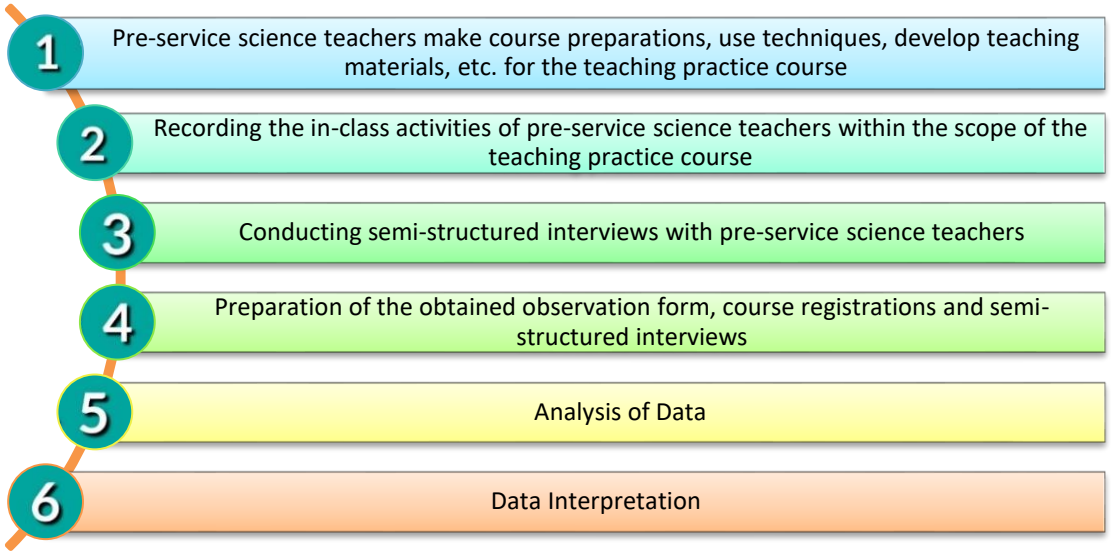

Figure 2. Data collection process

As stated in Figure 2, the research was completed with the continuation of distance education of science teacher candidates within the scope of 'teaching practice', recording of courses, filling out observation forms, conducting interviews, organizing data, analyzing data and finally interpreting the data.

2.5. Analysis of Data

In the study, the content analysis method was used in which the existence of codes in the qualitative data obtained during the analysis process was determined, themes were created by combining these codes and inferences were made (Creswell, 2007). The data obtained as a result of the semi-structured interviews and the observation form were subjected to content analysis in parallel with this and presented through tables and figures. In the meantime, NVivo 9 package program was preferred to facilitate analysis. Thanks to this program, a very comprehensive analysis process is carried out from the creation of categories to the provision of relationships, from the easy change of theme names to the creation of matrices (MacMillan & Koenig, 2004). As a result of the repetition of the codes by different researchers within the framework of the consistency dimension, the compatibility between the codes was examined and the Kappa Reliability coefficient was calculated as 0.81. It would not be wrong to say that there is a perfect match between the codings depending on the fact that the corresponding match is above 0.75 (Bakker et al., 2015).

3. FINDINGS

This research which is aimed to determine the perspectives and course activities of pre-service science teachers within the scope of the 'teaching practice' course during the COVID-19 pandemic process detailed information about the distance education thoughts, distance education emotions, the concept of "teacher" in distance education, problems and suggestions in distance education, preferred teaching methods in distance education, preferred teaching activities in distance education and implementation and management process in distance education will be conveyed in this section.

Table 2. Opinions of participants about thoughts regarding distance education

Theme	Category	Explanation	Frequency
Thoughts Regarding Distance Education	Internet	Internet access	1
	Technological Tools	Computer, tablet phone etc.	2
	Online Courses	Conducting online courses and assessment and evaluation activities	1
	Problems	Communication/connection etc. problems	4

As outlined in Table 2, when pre-service science teachers heard the concept of distance education for the first time, they answered under four categories: internet, technological tools, online courses, and problems. The opinions of pre-service science teachers about the categories are presented below:

> ***Internet:*** T01; *"When I heard the concept of distance education, the concepts that first came to me were the Internet, the online classroom environment, and the web-based applications used. Since, as you can see from the name, distance education is a non-face education program. We can only provide that on the internet. Where there is no internet, there is no talking about distance education"*
> ***Technological Tools:*** T02; "*I think that distance education is technological tools. For example, computers, tablets, phones, or any tools for online training.*"
> ***Online Course:*** T05; *"The concept of distance education calls for online courses and online exams"*
> ***Problems:*** T08; *"Internet breakdowns, connection slowdowns, sound imports, and other concepts that I can think of in ping. Students certainly have a harder and more challenging learning process than one-on-one training."*

Table 3. Opinions of participants about emotions regarding distance education

Theme	Category	Explanation	Frequency
Emotions Regarding Distance Education	Anxiety	Nervous and depression	2
	Fear	Afraid, horror etc.	4
	Curiosity	Curious about online system	1
	Sadness	Unhappy	1

As seen in Table 3, the feelings that students feel when they first hear the concept of 'distance education' were collected under four categories: anxiety fear, curiosity and sadness. The opinions of pre-service science teachers about the categories are presented below:

Anxiety: T06: *"I was nervous when I heard about distance education. What concerns me was that I thought my technological knowledge was inadequate. I have been thinking long and hard about whether I cannot get on the site if I am out of attendance or I am in a bad Internet jam. Like everyone else, I had the idea of how efficiently a person can study in a computer environment."*

Fear: T05; *"I was afraid of how to do it at first. Because I do not know the system. I am not good at computer skills. I had ambiguities in my head because of the first internship experience and the first situation I encountered in distance education. Since I didn't get any distance education training, I thought I'd be forced to plan because the course process is limited."*

Curiosity: T07; *"I was curious about how it would be since we have never trained in such a system before."*

Sadness: T08; *"I was very unhappy to hear about it the first time. Since I think your teaching students are seeing."*

Table 4. Opinions of participants about the Concept of "Teacher" in Distance Education

Theme	Category	Explanation	Frequency
Opinions on the Concept of "Teacher" in Distance Education	Technological Skills	In the distance education process, the teacher should have technological skills.	6
	Innovation	In distance education, a teacher must be innovative.	2

As illustrated in Table 4, the pre-service science teachers' minds about 'teacher' in distance education were collected under the technological skills and innovation categories. The opinions of pre-service science teachers about the categories are presented below:

Technological Skills: T01; "*The hardware that teachers should have: First, they should be able to closely monitor technological developments and use technology effectively and use the activities on the web correctly.*" and T05; *"They must have digital capability, digital literacy, application capability, and computer domination."*

Innovation: T07; *"The teacher must take advantage of a lot of materials and be equipped with them, different and remarkable activities will make it more fun for students to stay on the PC. The teacher should add new things to their information, and it will always make learning the same words or activities boring. I have tried to be understanding with students about everything, and I know that the process is difficult for them, and it takes time to learn new information*

. I tried to regenerate myself, always trying to add new ones to my knowledge."

Table 5. Opinions of participants about the Concept of "Teacher" in Distance Education

Theme	Category	Explanation	Frequency
Problems Encountered in Distance Education	Lack of Infrastructure	*No audio, no audio transmission, Internet interruption, etc.*	4
	Inexperience	*Lack of time to schedule, not knowing activities, not knowing applications, not knowing how to include students in the online process, etc.*	2
	Lack of Infrastructure + Inexperience	*There are problems with both problem states*	2
Suggestions for Problems in Distance Education	Skills Training	*Communication, technical skills, digital literacy skills, etc. various skills training*	4
	Innovation	*To find new activities in the distance training process, to focus on new techniques*	2
	Lower Structure Support	*Internet interruptions, tool-tool disruptions, etc. alternative ways to setbacks*	2

As Table 5 demonstrates, the problems faced by the pre-service science teachers in distance education were identified as lack of infrastructure, inexperience, and lack of infrastructure + inexperience, and suggestions for problems in distance education were collected under three categories as skills training, innovation, and lower infrastructure support. The opinions of pre-service science teachers about the categories are presented below:

Problems encountered in Distance Education

> ***Lack of Infrastructure:*** T02; *"We are experiencing systemic problems. For example, we can have a falling out of the system when we are doing a lecture. We can also have Internet problems. During the course, we can experience problems such as a freeze in the image, and no sound is transmitted. It can also be caused by problems caused by students."*
>
> ***Inexperience:*** T06; *"My biggest problem was I never saw the faces of the kids, I didn't know their names, and I didn't know where the names were seen on the zoom program, and when I asked a question, I didn't know whom to give the right to say, and I was saying, "there were two names on the screen."*
>
> ***Lack of Infrastructure + Inexperience:*** T01; *"Insufficient knowledge of the practices to be used in distance education. Causing class turmoil as a result of students not attending class or not being able to control attendees. Although we spent effort in maintaining class dominance in the normal classroom environment, I think it was more difficult in distance education. Sometimes I was negatively affected by the fact that students did not participate in the process at all or participated in a very active way."*

Suggestions for Problems in Distance Education

> ***Skill Training:*** T08; *"I'll explain this as follows. My friend wanted to share content with the students and turned-on screen sharing. Nevertheless, the sound was not going the other way. It is a big problem, the students start talking, and everybody says something. The teacher cannot solve the problem with my friend, etc. So, the point is that they can use computers and technology effectively"*
>
> ***Innovation:*** T02; *"To reduce student-related problems, we can create student-centered plans to increase their participation in the course, apply different teaching methods to suit the acquisition rather than the narrative method to separate our course from the monotony and provide relevant computer-assisted activities to keep students engaged in the course.*
>
> ***Lower Structure Support:*** T05; *"Computer technical problems, internet interruptions in students or teachers, electrical problems are a problem in preventing distance education."*

Table 6. Opinions of participants about Preferred Teaching Methods in Distance Education

Theme	Category	Explanation	Frequency
Preferred Teaching Methods in Distance Education	Daily life contexts	*Supporting the lesson with examples from everyday life in order to embody the concepts and attract the attention of the students*	2
	Plain narration	*Clear, understandable, short, concise expression, often repeated*	4
	Concept Teaching Materials	*To enrich concept teaching with teaching materials such as Structured Grid, concept map, concept network, etc.*	1
	Instructional Technology	*Animation, simulation, augmented reality, online competition applications for assessment and evaluation, etc. to be included in the course*	1

As Table 6 illustrates, the teaching methods preferred by the pre-service science teachers in distance education were collected under four categories: daily life contexts, plain narration, concept teaching materials, and instructional technology. The opinions of pre-service science teachers about the categories are presented below:

> ***Daily Life Context:*** T01; *"To draw students' attention to the subject and to raise their interest. My advice on this is to include examples of everyday life. In order to provide distance education, we need to provide examples of many activities we do in everyday life in classroom environments and attract students' attention."*
> ***Plain Narration:*** T03; *"Sentences should be short and self-explanatory in the teaching of concepts and basic principles too long sentences can make it difficult for students to learn. The concept can cause misconceptions."*
> ***Concept Teaching Materials:*** T04; *"The concepts are abstract, making it difficult for students to visualize. Therefore, to embody concepts, the meaning Resolution Table, the concept Network, the concept Map, and the Information Map must be used."*
> ***Instructional Technologies:*** T06; *"The course narration is absolutely essential to use simulations of images. Videos on some animation sites focus children's attention on the course."*

Table 7. Opinions of participants about Preferred Teaching Activities in Distance Education

Theme	Category	Frequency
Preferred Teaching Activities in Distance Education	Video	4
	Virtual Laboratory	3
	Animation and Simulation	3
	Interactive Game Play	2
	Education Informatics Network (EBA)	2
	Online Measuring Tools	2

As Table 7 exhibits, the teaching activities preferred by the pre-service science teachers in distance education were collected under six categories: video, virtual laboratory, animation and simulation, interactive gameplay, education informatics network, and online measuring tools. The opinions of pre-service science teachers about the categories are presented below:

> **T01;** "*The videos should be watched where necessary, and lectures should be performed with questions answered. Experiment environments must be prepared. Visual, video, animation, simulation, etc., as I mentioned at the beginning activities must be included. Groups should be formed and the discussion environment should be prepared so that students can learn the concepts."*

T02; "*The use of applications of virtual laboratory environments can be activated because the science course is a very suitable lesson for experimenting."*

T03; *"The technology should be utilized by using technology tools to attract students in the distance education process, and by drawing attention to the course with the help of visuals and simulations, experiments that cannot be done in visual or classroom environments. The concept misconceptions must be corrected"*

T04; *"In distance education, interest can be achieved through the abundance of visuals and using videos. Having activities that students can be active in increases their interest in the course. Students can be confronted with their misconceptions by creating a discussion environment to solve the concept illusion."*

T05; *"The activities can be carried out together. Online tests can be solved. Students may be asked to provide homework in the course, so they can learn to use technology and be active in the course."*

T06; *"Entering a video at the beginning of the course, using a photo that will be interesting, etc. activities are available. Their technological skills are already evolving over time, and sometimes when we ask students some things we do not know, they know better."*

T07; *"They should take advantage of many types of intelligence and areas such as videos, and songs, to attract attention. Interactive games attract students and create a more dynamic environment. To determine the concept misconceptions, questions should be asked about the learned concept, based on the answers given, the concept misconception should be identified, and the misconception corrected by various examples, practice questions, and similar activities."*

T08; *"As students are aged (from 10-15 to 15) when using remote education, I tried to choose easy-to-understand activities that would not overexert students or confuse them by looking at the idea of how much computer use can be the maximum, which is the maximum. I tried not to go outside the EBA where the students have already met, so that there would be no illusions or illusions in the students."*

Table 8. Opinions of participants about implementation and management process in distance education

Theme	Category	Explanation	Frequency
Implementation Process in Distance Education	Diversity	*To include differences in method, technique, visual, material, etc. that will appeal to each student in all educational activities*	3
	Time	*Managing time well, planning activities accordingly*	5
	Student-Centered	*Aiming to engage and activate the student*	4
	Learning Outcomes	*Adhering to the stated achievement*	3
Management Process in Distance Education	Time Management	Right to Speak: *Eliminating students from speaking and responding on their own during the course process*	3
		Uninterrupted Internet: *Alternative ways for Internet outages*	2
		Again: *Increasing frequency of repetitions since students are disconnected from the lesson, their interest in other things cannot be controlled*	4
	Classroom Management	Right to Speak: *Elimination of students speaking on their own during the course process and responding or not taking any words at all*	3
		Chat: *Block the chat environment where students can communicate with each other through the app*	1
		Hardware: *Disruptions in sound, internet and video make it difficult*	4

Communication	Using Sound Effectively: *The use of sound, which is an important tool for communication with students*	1
	Transmission of Sound: *Elimination of disruptions to the transmission of sound*	2
	Camera View: *Mutual image to ensure eye contact*	4
	Concept Usage: *Correct use of concepts in order not to cause misconceptions*	1

When Table 8 is examined, the implementation process of the pre-service science teachers in distance education was collected under four categories: diversity, time, student-centered, and acquisition-oriented categories. The management process of the pre-service science teachers in distance education was collected in three categories: time management, classroom management, and communication

Implementation Process in Distance Education

Diversity: T01*: "To include various methods and techniques. Because in the process, it should be able to activate the student and correct their concept misconception"* and T06; *"I did a study of what method of location I would describe the course by, as I explained the course using different methods and techniques."*

Time: T02; *"The criteria I consider when planning my lesson include time. I took care to look at the concepts I could give within half an hour because we were limited in time and to include activities where students could test their learning and reinforce their learning."*

Student-Centered: T01; *"Preparing activities that may attract students. Because the more attention the student is drawn to a subject, the catchier it is and the more relevant it is. The student should be given a voice and enabled."*

Learning Outcomes: T06; *"I prepare a learning plan for the learning outcome. I have got a plan for that, according to the textbooks."*

Management Process in Distance Education

Time Management: T01; "*The time-efficient use of thumb removal can be allocated time to pre-determined activities.",* T04; *"Internet slowness may take some time to open a presentation or event while performing a course presentation. There can be a fall from the system. You must keep taking students to class, and time goes by when you're following them. In such cases, the teacher may not be successful in terms of time control."* and T07; *"Students are involved in extracurricular activities during the course, and it is difficult to control the student because it is distance. He doesn't answer enough when I ask a question, so I must summarize it repeatedly."*

Classroom Management: T01; *"The finger lift can be used for classroom management. Ideas or answers that are intended to be shared can be specified in this way. This allows all students to participate in the course and eliminate complexity."*, T02; *"Students can have private conversations between courses. Therefore, students are disassociating from the course. The presence of messaging in the app allows students to have private conversations."* and T03; *"Disruptions, such as cutting the Internet, the microphone not working, or the fact that it remains on, have made it very difficult for me to focus on what I'm going to be told to keep the classroom organized."*

Communication: T01; *"Assuming that the teacher is the one who started the communication, he should use the language effectively. Considering the recipient is also a student, they are expected to respond to the message being sent. Because communication needs to be mutual to be healthy."*, T04; *"The lack of response from some students in the course process due to Internet infrastructure and technical shortcomings, which is the lack of feedback in communication, harms communication. When there's no sound, the teacher is suspicious to see if the student is listening. And it's getting the teacher's motivation down"* and T06; *"The must-have eye contact in effective communication. Eye contact means feedback. But there was no eye contact in distance training."*

The opinions of pre-service science teachers about the categories are presented below:

4. DISCUSSION and CONCLUSION

When pre-service science teachers heard the concept of distance education for the first time, they answered under four categories: internet, technological tools, online courses, and problems. Most of the pre-service science teachers have been determined to refer to the concept of distance education as a 'problem'. Concordantly, the pre-service science teachers have experienced problems in teaching and have developed prejudices on the concept of distance education during the period of 'teacher practice'. On the other hand, the definitions for the problems and suggestions of teachers in the distance education process in Table 5 also prove this situation. When table 4 is examined, it is seen that the pre-service science teachers define the problems encountered in distance education as lack of infrastructure and inexperience. In the study conducted by Tabata and Johnsrud (2008), the study found that 3 different factors such as conditions, time and space were effective in the development of attitudes toward distance education. Moreover, the lack of infrastructure and inexperience of pre-service science teachers in distance education affected education process. Therefore, given the limitations of pre-service science teachers to support technological pedagogical content knowledge and the continued domination of traditional approaches in the education process, the conditions available in education faculties may be said to be effective in describing distance education as a problem. In addition, like the Covid-19 pandemic process, it can be said that a process that has not been experienced and portended has suddenly erupted, resulting in rapid digitization and that a quick change of the process has a direct effect on people such as health factors from a sensory perspective, science studies have directly and indirectly affected pre-service science teachers' distance education associations. Most participants in the concept of distance education can be characterized as a "problem", and after the Covid-19 pandemic process is completed, pre-service science teachers will not provide access to distance education. Additionally, the disadvantaged situations experienced in distance education, and advantageous situations are highly varied, so it is very valuable to identify and address the causes of these biases. In this regard, the prerequisite for teachers to raise tech readers is for teachers to become technology readers and to use the technical information they have in classroom applications in a meaningful and harmonious manner (Bakırcı, Ercan & Cengiz, 2022; Mishra & Koehler, 2006).

Pre-service science teachers will conduct the 'teaching practice' through distance education in the Covid-19 pandemic process, their emotional state is identified as anxiety, fear, curiosity, and sadness and presented in Table 3. When table 3 is examined, it is seen that a significant proportion of science teachers experience a sense of fear. Concordantly, these findings of the study suggest that the students of the science program in Turkey are focusing on disadvantages within the framework of distance education. It is estimated that the students of science teachers focus on these disadvantages and experience fears because they find themselves inadequate within the scope of technological pedagogical content knowledge. Technological pedagogical content knowledge is that a teacher knows how to use their technological knowledge in pedagogically meaningful classroom applications (Ayvaci, Simsek & Bebek, 2019). It can be said that there are fears of carrying out the process because they are not capable of technological pedagogical autonomy. The definitions for the concept of teacher in the distance education process in Table 4 also prove this situation. When Table 4 is examined, it is seen that the pre-service science teachers define the concept of 'teacher' in the distance education process with technological skills and innovation. Mishra and Koehler (2006) explained to pedagogical content knowledge for teachers to be able to train effectively, effectively integrating education technologies into their classroom and subject matter will make remote training activities more effective. Therefore, it can be said that the fears of the teachers of science are directly related to technological pedagogical content knowledge and their self-qualifications in this regard. CAO and others (2020) have determined that in the process of the Covid-19 pandemic, students in China have

been concerned about the outbreak of a 25% slice of their university students in their study to understand their psychology. This occasion can portend that the feelings of fear and anxiety that teachers carry are unpredictable and caused by an outbreak that has never been experienced before. However, Burke and Dempsey (2020) reported that there was an opportunity to embrace the world of digital learning because it was said to save time for exploration, procurement, and creation of resource and learning plans, while at the disadvantage, educators were under pressure to provide online learning, and that when schools were reopened, they were concerned that teaching programs would not grow. Similarly, Angoletto and Queiroz (2020) highlighted that digitization logic is not simple and underlined that "learning technologies", which are adopted in emergencies, is an exit point. In this regard, it should be said that it will be important to turn impossibilities into possibilities.

When the opinions of pre-service science teachers about problems in distance education were examined, the problems in distance education as stated in Table 5 were determined as a lack of infrastructure and inexperience. Carrillo and Flores (2020) also discussed the presence of some students in their homes who did not have computer-internet access and found that there was a decline in their education. The problems with internet connectivity have been highlighted several times by researchers regarding the hardware (Asmara, 2020; Dias, Lopes & Teles, 2020). Dutta and Smita (2020) expressed that the Covid-19 pandemic process found that students experience problems such as lack of electronic devices, limited internet access, expensive internet fee, slow internet speed and difficulties using online platforms in their studies with university students in Bangladesh. Concordantly, there are parallels between the studies in the literature and the data obtained in the research. On the other hand, the delivery of internet services in distance education is a very effective factor in the socioeconomic situation of families (Bennett, Uink & Cross, 2020). As a matter of fact, it has been determined that the number of students who are not able to benefit from distance education services in the pandemic process in our country is at serious levels, in this sense the lack of opportunity has reduced the quality of education. However, science is a remarkable finding that teachers should often talk about the factor of inexperience within the scope of 'teaching practice'. Although studies were included in the international literature as stated above in the background of infrastructure fencing, there were no studies that mentioned the inexperience of teachers or lack of experience for teachers. The findings and area of the summer clearly show that in the context of Turkey, teachers have distance education experience shortcomings. The basis for this lack of experience is a clear indication that although the conventional concept of 'traditional education' has been tried to change, it cannot be eliminated. Although the perspective of education has taken an effort to raise the pre-service teachers with innovative approaches in mind, it is observed that it is not easy to move away from adopted approaches. In this regard, innovative educational approaches should be adopted by pre-service teachers and their experiences obtained should be developed through practice. When the opinions of pre-service science teachers about suggestions for problems in distance education were examined in Table 5 were determined as skill training, innovation, and lower structure support. The Covid-19 pandemic process is clear that there is a catalyst for effective use of digital devices, online resources, social media technology and e-learning activities (Mulenga & Marban, 2020). Therefore, the recommendations provided to address the mentioned negatives aim to extend this effective use beyond the Covid-19 pandemic process. In addition to the use of technological skills and training of pre-service science teachers, it has been noted that innovative activities will close the lack of experience and improve self-sufficiency through the course process and that infrastructure support will be a solution for the remediation of infrastructure deficiencies.

When the opinions of pre-service science teachers about preferred teaching methods in distance education were examined in Table 6 were determined as daily life contexts, plain narration, concept teaching materials and instructional technology. Table 6 detailed narration activities obtained by the observation forms of the pre-service science teachers. It was determined that the teaching

methods were mostly questions and answers, problem-solving and straight narration (Basilaia & Kvavadze, 2020). This result is largely parallel to the methods teachers use in the reports of researchers in some countries (Burke & Dempsey, 2020; Mulenga & Marban, 2020). Literature reports that in the Covid-19 process teachers and teacher candidates must use many technological hardware and software for distance education (Mohan et al., 2020). It has been determined that the pre-service science teachers have positive effects of the Covid-19 process as part of the "teaching practice" and are obliged to diversify distance education activities and tend to innovative approaches.

The opinions of pre-service science teachers about the implementation process in distance education were identified as diversity, time, student-centered and learning outcomes in Table 8. It portends that the pre-service science teachers are on the "time" element, especially as a result of inexperience, as part of the distance execution of the 'teaching practice' process. The pre-service science teachers experience the teaching profession, feel teaching and practice, there was a concern that the process would return to education remotely and therefore the period would not be reached, and the issue would not be completed. This result demonstrates that the skills of pre-service teachers for teaching technologies and the activities of material development in education technologies are not capable and should be developed. In this regard, the process of "teaching practice" should be discussed. Because researchers suggested that the time of the course for 'teacher application' is insufficient in Turkey (Kaba & Urey, 2022). Additionally, it is stated that pre-service teachers have a high degree in senior year and have a high degree in KPSS, which prevents them from giving time and importance to teacher practice. Given all these reasons, it is likely to be suspicious of the effectiveness of the distance education. Moreover, it is considered that the process of teaching practice is not fully qualified to improve the skills of technological pedagogical content knowledge and teaching technologies and to be actively used. The considerations of the course processes have been reviewed in 3 sections as time management, classroom management and communication. The studies have said that the most repetition in time management during the course preparation process is affecting and making the process difficult during the course, as teachers have often mentioned time in the course preparation process in the distance of the process as part of the "teaching practice". They mentioned that students have broken out of the course, repeated more often because they don't listen and that the students who have recently failed to make one-on-one eye contact have become more frequent because they have a sense of not understanding, and that they have tightened the repetition.

Recommendations

A variety of projects can be developed to improve the existing infrastructure and provide more infrastructure support within the framework of distance education and instructional technologies to pre-service science teachers. Thus, universities, schools, teachers, students, and parents will be able to become a stakeholder in education technologies.

Pre-service teachers should be given the training to enable them to develop themselves in the context of the distance education process, applications that can be carried out in the process, points to be considered, and technology literacy.

It is thought that the fact that the teaching practice course was carried out on a distance education platform for the problem of time experienced in the face-to-face implementation of the teaching practice course may break the prejudices of the pre-service teachers towards the course. In this regard, it is suggested that teaching practice or internship courses can be conducted in the form of distance education in areas that do not require complex application methods and techniques.

The Covid-19 pandemic process may include research in various departments for teacher implementations to teaching practice, where their views are determined and even compared.

The Covid-19 pandemic process is considered to be a major contributor to field writing, especially in the scope of "teaching practice" and in the studies in all countries where comparisons are made.

The courses for technological pedagogical content knowledge are emphasized and encouraged to be aimed at classroom applications that are free of theoretical knowledge. This will prevent students from taking the challenges faced by teachers, especially during the Covid-19 pandemic process, to educational environments.

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