The Use Of Edmodo In Creating An Online Learning Community Of Practice For Learning To Teach Science

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ABSTRACT

This study aimed to create an online community of practice by creating a virtual classroom in the Edmodo application and ascertain the opinions of pre-service primary teachers about the effects of Edmodo on their learning to teach science and availability of Edmodo. The research used a case study, which is one method of descriptive research. During the implementation process, pre-service primary teachers used Edmodo to share activities they had designed that centred on the scientific concepts taught in primary science education programmes. They also shared their diary entries that outlined their experiences and views after they had practised their activities in a real classroom. 58 pre-service primary teachers participated in the study. The author developed a questionnaire and it included one closed-ended and six open-ended questions; the questionnaire was used as the data collection tool. The pre-service primary teachers used Edmodo for 12 weeks. Descriptive and content analysis methods were used to analyse the data obtained from the study. The results obtained from the data analysis showed that pre-service primary teachers generally had positive views about the use of Edmodo in teacher education programmes. Most pre-service primary teachers stated that Edmodo provides the possibility of sharing knowledge, experiences and views. However, some pre-service teachers stated that Edmodo has some limitations; for example, the fact that it requires the user to have internet access. As a result, it can be said that Edmodo can be used to create an online community of practice in teacher education programmes.

Keywords: *Edmodo, online community of practice, teacher education*

INTRODUCTION

Nowadays, it is expected that individuals should adapt to a changing of the society and use the technological innovations effectively and fruitfully in their life. The most important factor in creating an information society is to produce teachers that can educate individuals. So, one of the common factors noted in all studies concerning one of the requirements of an effective education is that teachers play an important and vital role in teaching and learning (Mapolelo & Akinsola, 2015). The most important role of teachers is to both help students to learn new concepts and principals and to educate students to become productive individuals in society. The sustainability and determination that the individuals will have for renewing by themselves depends on gaining life-long learning skills, such as cooperative learning and critical and creative thinking, in learning environments (Budak, 2009). These learning environments aim at providing a learning process that is more comprehensive than traditional approaches and the environments require communication and technology to help new generations to learn (Mokhtar, 2016). This is because students need more than the existing methods used in traditional classrooms and they require more up-to-date technological devices that allow them to access knowledge at any time and place—this is indispensable for

students (Ekmekçi, 2016). For this reason, it is currently expected that teachers should tackle problems by adapting to a changing society, consistently developing their professional ability and using technological devices in the learning environment. Trust (2012) has stated that teachers that are consistent learners and who study in order to develop their practices, skills and teaching strategies help students to gain life-long learning skills and learn new concepts and principals. In this context, teacher education programmes are an important factor in teacher education.

Generally, teacher education programmes involve theoretical courses that offer pedagogical knowledge and practical courses for pre-service teachers to gain experience of teaching practices. Theoretical courses are given to pre-service teachers in teacher education programmes in Turkey over the course of four years and pre-service teachers take practical courses called "school experience" and "teaching practice" during the third and fourth grades of the programme (Yök, 2007). In these courses, pre-service teachers gain pedagogical knowledge and content knowledge necessary for their professional life (İnel-Ekici & Delen, 2016). The theoretical courses in the teacher education programmes supply teachers with knowledge about the theoretical foundations and characteristics of teaching methods and techniques and the role of teachers and students in the learning environment, which helps to create an active learning environment for pre-service teachers. Pre-service teachers design teaching activities by using the knowledge gained in these courses and practise these activities in practical courses and during their internship. The continued problem for many years in preparing pre-service teachers for their professional career has been focused on the effort to reduce the gap between teachers' professional knowledge and their practical knowledge (Hatch, Shuttleworth, Jaffee & Marri, 2016). Sterenberg & O'Connor (2014) have argued that a connection should be created between theoretical and practical courses in teacher education programmes. Generally, pre-service teachers are allowed limited practice during their internship and in their practical courses. They do not gain enough teaching practice to be effective because of limited course time. The effectiveness of these courses can be increased by using environments that are supported by the internet. The web 2.0 environment is a new technology compared to other technologies and is richer than other information technologies as it can meet diverse personal needs (Yi & Hwang, 2003). The internet—and social networks in particular—is useful not only for entertainment but also for education. These networks can be used for supporting both distance learning and the real classroom environment (Thongmak, 2013). The literature has noted that web tools help students focus on the learning process, support learners in planning their research and constructs their knowledge by taking into account the processes of gaining knowledge and the classification or visualisation of data. Learners can control the computer systems (Bell, Urhahne, Schanze & Ploetzner, 2013). Löhner, van Joolingen, Savelsbergh & va Hout-Wolters (2005) have argued that the computer environment is a powerful tool for helping students to develop their understanding of the inquiry-based learning process in their studies. Methods for connecting knowledge acquisition and communication technology in pedagogy have been the subject of studies carried out in last 20 years in the field of education (Enache, Eftimie & Margaritoiu, 2010). Studies have focused in particular on how to create a community of practice in which pre-service teachers can discuss their practices and how web technologies can benefit the education of pre-service teachers. These environments provide informal learning to help pre-service teachers practise the skills that they gain in their formal education and the environments allow pre-service teachers to discuss any issues concerning the planning, implementation and evaluation of their courses (Khalid, Joyes, Ellison & Karim, 2013). These communities are called communities of practice (Wenger, 1998) and they are important in the effective professional development of teachers (Lai, Pratt, Anderson & Stigter, 2006). Lai, Pratt, Anderson & Stigter (2006) have outlined the characteristics of communities of practice as follows:

- They require a shift in emphasis from formal training to learning in practice;

- Communities of practice go beyond traditional "one-shot" and "face-to-face" models of event-based, expert-novice forms of professional development; and

- Communities of practice allow teachers to act as co-producers of knowledge, which requires greater personal responsibility for professional growth.

There is a growing importance in the use of online communities of practice for the professional development of teachers. In particular, they are used to help teachers and educators reflect on their practices in a collaborative and supportive learning environment (Kirschner & Lai, 2007). To create online communities

of practice, teacher educators can design their own website or use an existing website. Diverse websites are enriched by mobile technologies and can be used by teachers and pre-service teachers for free. These applications work as social networks and are applications based on web 2.0 technologies, allowing users to share personal knowledge with each other (Hossain & Wiest, 2013). Online social network sites are perfect communication tools for constructing knowledge based on social relationships, communication, collaboration and task sharing (Balasubramanian, Jaykumar & Fukey, 2014; Hossain & Wiest, 2013). There are various online teaching tools that are suitable, open and free for teachers to use. The most popular tools are Whiteboard, WordPress, YouTube, Facebook, Linkedin, MySpace, Nexopia, Twitter and many others (Hossain & Wiest, 2013; Mohamad, Salleh & Salam, 2015). Edmodo is an application that can be used on both mobile devices and in the web environment to create an online community of practice. Edmodo is a free social learning platform that allows students to access the course content uploaded by their teachers. The platform allows teachers and students to communicate with each other via messages, thus providing learners with the chance to communicate and collaborate in a virtual classroom environment (Balasubramanian, Jaykumar & Fukey, 2014; Ekmekçi, 2016; Mokhtar, 2016). The difference between Edmodo and other social network sites is that Edmodo is a social learning platform designed for collaboration, communication, the sharing of knowledge, homework and discussion between students, teachers and parents (Balasubramanian, Jaykumar & Fukey, 2014). In Edmodo, every member has a profile page that is composed of groups, communities and their latest posts. Members can upload a profile image and share links and videos (via YouTube) on their page. They can access libraries, teaching/learning materials and their pages everywhere (when at home, school and travelling) through Edmodo (Trust, 2012).

Some studies that have focused on the use of Edmodo in education are included in the literature. Generally, in these studies, the Edmodo application was used by students that study at different education levels and the studies evaluated the factors affecting the use of Edmodo by taking into account students' views about Edmodo. Ekmekçi (2016) explored students' views about the use of Edmodo as an assessment tool in English language classrooms; Thongmak (2013) created an instructional guide for using Edmodo more effectively after determining the views of university students about the Edmodo application. Similarly, Enriquez (2014) explored high-school students' perceptions of the effectiveness of the use of the Edmodo application as a support tool for learning. The results obtained from the analysis of focus group discussions and interviews showed that students thought that Edmodo is an effective tool. Balasubramanian, Jaykumar & Fukey (2014) used Edmodo in a course with university students and they assessed the reasons for preference for Edmodo using an online five-point likert questionnaire. Researchers have suggested that teachers should use this application to empower collaboration and communication between students. There have been limited studies about the use of Edmodo in teacher education. Mohamad, Salleh & Salam (2015) studied the factors affecting teachers' motivation to use online teaching tools. The study determined four motivational factors: ease of use; entertainment; usefulness; and self-confidence. López, Leo & Miyata (2013) evaluated primary teachers' use of and attitudes towards Edmodo. This study determined that primary teachers had positive views about the use of Edmodo, since the foundation of Edmodo is communication and collaborative learning. As a result, it can be noted that the studies that have been carried out have mostly related to the use of the Edmodo application by university students and teachers. It is believed that further studies about the effects of the application and the use of Edmodo in teacher education are needed.

For this reason, this study was performed with primary pre-service teachers who created science-learning environments that help students develop various skills such as scientific inquiry, problem solving and creative thinking. Since primary teachers feel under-qualified in science teaching in comparison to other subject areas, and given that they rarely and ineffectively use science activities, science teacher educators struggle to develop content knowledge, pedagogical knowledge and self-efficacy in pre-service teachers (Carrier, 2009; Kim & Tan, 2011). In particular, pre-service teachers studying in Turkey are faced with problems in applying what they learn in theoretical lectures due to the limited hours of practical courses. This problem also affects the development of the pedagogical knowledge of the pre-service teachers negatively. In addition, pre-service teachers do not have a place or platform apart from class to share their experiences with each other. For this reason, it is often insufficient to develop various lifelong learning skills such as reflection and critical thinking of them. For example, the outcomes of some descriptive studies conducted with pre-service teachers in Turkey show that critical thinking disposition of pre-service teachers

is either low (Temel, 2014) or medium (Kartal, 2012; Korkmaz, 2009). This results are seen as a factor that prevents the pre-service teachers in Turkey from being successful in their professional career. So, in this process, connecting theoretical and practical courses and supporting real classrooms courses with online environments can be useful for teacher education. Edmodo can also positively affect the pedagogical development of pre-service teachers by helping them make connections between theoretical and practical science teaching activities and by allowing them to share their views with each other. This study aimed to determine the role of Edmodo in educating primary pre-service teachers about science teaching and it aimed to ascertain pre-service teachers' opinions about the use of Edmodo in teacher education.

Research questions

Teachers, students and education managers need to use technology for learning and professional development, since virtual learning environment and education tools supporting by technology are accessible to many people in the twenty-first century (Enriquez, 2014). Social networks such as Facebook, Twitter and YouTube are applications that are open and free and can be used for education. However, these applications have some limitations since they do not offer personalised spaces and they have insufficient security features. The use of Edmodo suggests that a secure learning platform for learners and educators is not yet readily available, although Edmodo is similar to Facebook (Thongmak, 2013). This study carried out an implementation process concerning the use of the Edmodo application in teacher education. After the implementation process, the study focused on the availability of Edmodo and the application's effects on pre-service teachers by determining primary pre-service teachers' opinions about Edmodo. The research questions are presented as follows:

1. What are primary pre-service teachers' views about the effects of the use of Edmodo on the learning-to-teach process, the ability to use technology and communication and collaboration skills?

2. What are primary pre-service teachers' views and proposals concerning the availability of the Edmodo application?

3. What are the views of primary pre-service teachers about the use of Edmodo on mobile devices and in the web environment?

METHODOLOGY

Method of research

The case study, a descriptive research method, was used in this study. Case studies aim to examine the features of an existing case and attempt to study and explain it in detail. In this study, the Edmodo application was used in a course called "Science and technology teaching", which is included in teacher education programmes. The study aimed to present information to researchers and readers about the availability of Edmodo through an evaluation of pre-service teachers' views on the use of Edmodo. A qualitative data collection tool was used for data collection. Firstly, the Edmodo application was introduced to the pre-service teachers and they were informed about how the Edmodo application is used. The teachers were then asked to use Edmodo within their courses. After the implementation process, the related data collection tool was applied to the pre-service teachers and the researcher collected the data.

Participants

The implementation process of the study was carried out a moderate-sized university in Turkey. In this study, 58 primary pre-service teachers (aged 20) studying education participated in the research. Of these, 55 pre-service teachers answered the questionnaire voluntarily. Participant pre-service teachers are studying in the third grade in the classroom education department. Before the study began, pre-service teachers had taken various theoretical training courses such as "science teaching laboratory practices", "introduction to educational sciences", "educational psychology" and "principals and methods of instruction". In addition, pre-service teachers have participated in courses about content knowledge such as physics, biology, mathematics and chemistry. Primary pre-service teachers took the first practical course the name of which is "School experience" during the period in which this research was carried out. In Turkey, when primary pre-

service teachers start their professional career they enter the classes of primary school students during their four years of education.

During the study, the pre-service teachers took courses in two different real classrooms. At the same time, two separate virtual classrooms were created in Edmodo for the pre-service teachers. In one of the virtual classrooms, 34 pre-service teachers were included and in the other virtual classroom 24 pre-service teachers were included. Of the participants, 74% (n=43) pre-service teachers were female and 26% (n=15) pre-service teachers were male.

Data collection

A questionnaire form, which is quantitative data collection, was used in the data collection process. Closed-ended and open-ended questions were included in the questionnaire form. In developing the data collection tool, the researcher first examined the related studies in the literature and, later, questions were prepared by taking account of these studies. The prepared questions were presented to expert lecturers in order to obtain feedback and ascertain the validity of the data collection tool. According to the views of the experts, some questions were removed from the questionnaire, some questions were rearranged and some questions were added. For example, "Did the use of Edmodo practice in the course help the development of your critical thinking skills? Why?", "Do you think that Edmodo practice is effective? Why?" was excluded from the questionnaire by experts as it directed the students to respond positively and directly, or the question was reorganized as "What were the positive and negative effects of the using Edmodo in the course of Science and Technology Education?". Instead of the extracted questions, like the following questions were added to the questionnaire in order to determine the positive and negative opinions of the pre-service teachers. The final version of the questionnaire was composed of seven questions. Below are several example questions:
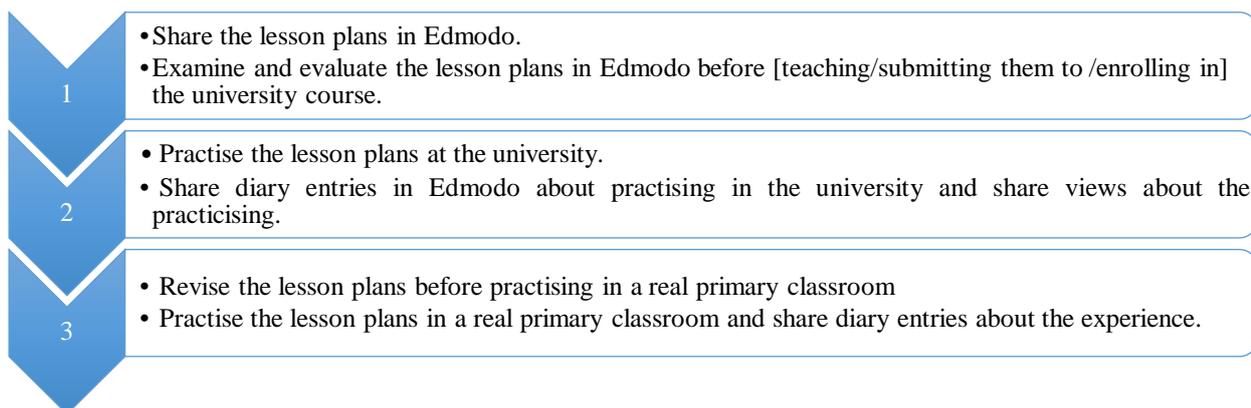
- How does using Edmodo affect your ability to use web and mobile technology?

- In your opinion, what are the limitations of the Edmodo application? What are the factors hindering your use of Edmodo?

- Do you prefer to use Edmodo in a web environment or on your mobile device? Can you explain the reasons for your answer by explaining what you believe are the advantages and disadvantages of Edmodo?

Data analysis

In the analysis of the data obtained in this study, descriptive and content analysis were used. In content analysis, researchers use transcripts that are composed of codes, such as numbers, words and special characters, and they use a list of categories prepared previously or they create categories after they have looked through the data (Dawson, 2007). In this study, two researchers read the data using open coding (Strauss & Corbin, 1998). Categories and themes were then determined. The experts carrying out the analysis determined two main themes: "the effects of Edmodo" and "the availability of Edmodo". The first theme, "the effects of Edmodo", was composed of three sub-themes: "opinions about the effects of Edmodo on pedagogical knowledge", "the use of technology" and "communication and collaboration". The other theme concerning the availability of Edmodo was evaluated under the three sub-themes, which were: "opinions about the limitations of Edmodo", "proposals for the development of Edmodo" and "the use of Edmodo on mobile devices and websites". The data obtained from several open-ended questions allowed for quantification with the calculation of frequencies and percentages to increase the clarity of the research data for readers and to compare the pre-service teachers' views. In the study, the correspondence percentage was calculated to provide the reliability of the data analysis process and to determine the level of consistency between the experts. The correspondence percentage between the experts was found to be 73%.

Implementation process

In this study, the Edmodo application was used to connect theoretical and practical courses in teacher education and to provide opportunities for students to collaborate and communicate with each other and share knowledge, opinions and experiments by creating a virtual classroom environment. The implementation process of the study was performed using primary pre-service teachers enrolled in a course called "Science and technology teaching". In a related course, the pre-service teachers learned theoretical knowledge about the teaching methods and techniques used in science teaching and they then put these techniques into practice by developing lesson plans using these methods. Before they practised these skills, the Edmodo application was used to allow the pre-service teachers to share the lessons plans they had prepared within this course. After the pre-service teachers had practised these skills, Edmodo was used for sharing their diary entries that focused on their opinions about their experience. Theoretical knowledge is taught for two hours a week during a three-hour class that is taught every week. The pre-service teachers presented and practised their lesson plans that they prepared during one hour of the course. The related course was taught in tandem with the course that focuses on "School experience", in which pre-service teachers practise in a real primary classroom. In the study, the pre-service teachers revised their lesson plans after practising with their university peers and by taking into account their peers' feedback; they practised the final version of their activities and plans in a real primary classroom. The study was carried out in the 2015-2016 semester over 12 weeks. In the implementation process, the pre-service teachers prepared lesson plans that focused on scientific concepts and they studied as a group. However, every pre-service teacher practised a part of their lesson plan in the university and in a real primary classroom environment and they shared their experiences with each other. In the study, a group of pre-service teachers prepared their lesson plans and uploaded them to the Edmodo application every week. The other pre-service teachers evaluated the lesson plans. The pre-service teachers were asked to prepare their lesson plans based on the 5e learning model that ensures the activities meet certain standards. The pre-service teachers included different teaching methods and techniques in their lesson plans. Figure 1 shows the implementation process as open and understandable.

1
- Share the lesson plans in Edmodo.
- Examine and evaluate the lesson plans in Edmodo before [teaching/submitting them to /enrolling in] the university course.

2
- Practise the lesson plans at the university.
- Share diary entries in Edmodo about practising in the university and share views about the practicising.

3
- Revise the lesson plans before practising in a real primary classroom
- Practise the lesson plans in a real primary classroom and share diary entries about the experience.

Figure 1. The implementation process of Edmodo.

FINDINGS AND COMMENTS

This section of the study presents and comments on the findings obtained from analysis of the answers given by the pre-service teachers to open-ended questions that focused on their opinions about the Edmodo application. Of the participants, 80% (n=44) pre-service teachers stated that they had not used Edmodo in any course before, while 20% (n=11) pre-service teachers stated that they had used Edmodo before. The findings of the study were evaluated under two main themes: "the effects of Edmodo on pre-service teachers" and "the availability of Edmodo in teacher education".

The effects of Edmodo on pre-service teachers

The theme called "the effects of Edmodo on pre-service teachers" was composed of three sub-themes in the study. These themes were: "the effects of Edmodo on pedagogical knowledge", "the ability to use technology" and "the collaboration and communication skills of pre-service teachers". Of the participants, 13% (n=7) pre-service teachers stated that the application did not positively affect the learning-to- teach process, while 51% (n=28) said that it did not positively affect their ability to use technology. Meanwhile, 18% (n=10) of the participants said that it did not positively affect the process of collaboration and communication.

Views about the effect of Edmodo on pedagogical knowledge

In the study, most of the primary pre-service teachers stated that the use of the Edmodo application in teacher education had a positive effect on their pedagogical knowledge. The pre-service teachers indicated that they took on board others' opinions about how they could teach better and that this helped them to see different perspectives in the virtual classroom environment. One pre-service teacher stated that, "We said each other the deficiencies of our lesson plans. New ideas helped us for preparing lesson plans better". Another pre-service teacher indicated that, "My friends' views provided for me to notice my mistakes". The pre-service teachers stated that because the lessons plans were uploaded to the application and were evaluated by their friends, they had an opportunity to see and correct their mistakes in the lesson plans. A pre-service teacher stated that, "We made comments to each other. In this way, we had a chance for seeing and correcting our mistakes". Another pre-service teacher noted that, "Seeing and correcting our mistakes by preparing our lesson plans has enabled us to develop different perspectives". The pre-service teachers indicated that the Edmodo application provided an opportunity to see and correct the lesson plans they had prepared before they enrolled in the university course. This helped them to learn to teach science more effectively. A pre-service teacher noted that, "Since we shared our lesson plans and presentations before the course, we could prepare the better lesson plans and the activities about the teaching of science concepts". The pre-service teachers pointed out that they could see and learn different teaching methods and techniques included in their friends' lesson plans when using the Edmodo application. They stated that the sharing of lesson plans composed of different teaching methods used in science teaching provided an opportunity to learn these methods in lesson plans before they took part in the university course. Several pre-service teachers noted the following: "We went to course by making preparations since we saw our friends lesson plans in advance and the course passed entertaining"; "We could estimate what would be in the course since we read the lesson plans before the course in the university. This provided for us to come to course by thinking these subjects, methods, activities"; and "If we had not shared and commented about the lesson plans and activities, we would not have distinguished most of teaching methods while our friends were presenting and practising their lesson plans and activities".

Views about the effect of Edmodo on the ability to use technology

Approximately half of the pre-service teachers who participated in the study mentioned the positive effects of using Edmodo on their ability to use technology. The other pre-service teachers stated that the Edmodo application did not particularly affect their ability to use technology since they had already been successful in using computer and mobile technologies and they already found the use of the Edmodo application to be simple. Some pre-service teachers who noted the positive effects of Edmodo pointed out that they used a mobile application in this course for the first time and they learned how such an education application can be used within a course. A pre-service teacher stated that, "I think that the Edmodo application developed our skills about the using of mobile technologies in education since we do not use Edmodo before. Besides, I used the word office program in a mobile device by Edmodo for the first time. This was positive contribution to me." Another pre-service teacher noted that, "We learned the mobile applications like Edmodo and the web sites about the education and teaching activities. And, we learned how these applications will be able to use to teach new concepts to students and to provide for the students to gain life-long learning skills". Some pre-service teachers stated that they already knew how to use computer

and mobile applications but that they had been able to use a mobile application more effectively; one participant noted that, "If you know computer technologies, Edmodo does not affect the ability to use of technology. However, it provides for you to use a mobile application more effective and actively". Some pre-service teachers included in the study indicated that their skills in using a web environment for education had been improved and that they wanted to use this and similar applications in teaching and learning: "My practical skills in the using of the computer and my ability to use of this and like these mobile applications developed"; "My skills to use computer technologies developed. Because Edmodo is an education site based on web environment. In this web site, I could upload the documents and commented to posts in Edmodo". As a result, it can be said that the pre-service teachers, whose skills in the use of technology in education were not sufficient, gained ideas about how computer and mobile technologies can be used for education and they showed how their opinions had developed after the implementation process by putting these ideas into practice.

Views about the effect of Edmodo on communication and collaboration

The Edmodo application provides an environment for students who participate in the virtual classroom to collaborate and communicate. Similarly, in this study, the primary pre-service teachers shared their views with each other by uploading to Edmodo the lesson plans that they had prepared, providing them with the opportunity to see and correct their mistakes. The pre-service teachers who participated in the study supported this claim: 82% (n=45) of the pre-service teachers who participated in the study emphasised that the Edmodo application had a positive effect on collaboration and communication between students. The pre-service teachers stated that they could open up in the virtual environment, that communication between peers increased and that they could see different perspectives. Several participants noted the following: "Saying to want to say in virtual classroom are more relax than traditional classroom. We thought that our lesson plans were better after taking our friends views about this plan"; "We helped each other. We transferred different ideas each other"; "Edmodo provided for us to respect different ideas. Our communication between all friends affected positively since some friends that we do not communicate in real classroom commented to our lesson plans and contributed our studies"; and "My friends and me said our thoughts and feelings more relax than traditional classroom". The pre-service teachers pointed out that they could learn to teach science from each other in cooperation by using Edmodo to share their feelings and opinions. While one pre-service teacher stated that, "Edmodo was effective in correcting of my mistakes, in completing of deficiency in my lesson plan, in evaluating myself", other pre-service teachers indicated that, "Edmodo much contributed to cooperative learning. In implementation process, we shared our views each other and we supported each other" and that, "We prepared our presentation and lesson plans together. We made positive or negative comments for lesson plans prepared by our friends. We took feedbacks from each other". Several pre-service teachers noted the positive effects of Edmodo on collaboration and communication but said they had encountered some problems because of the critiques offered. A pre-service teacher stated that, "There were an intensive communication between classmate. But, we met some problems since some friends do not like the criticism and some friends made unnecessary and unjustified criticism".

The availability of Edmodo

The analysis of open-ended questions about the availability of Edmodo constructed three sub-themes. These themes were "the limitations of the Edmodo application", "proposals for the development of the Edmodo application" and "a comparison of the use of Edmodo in a mobile and web-supported environment". Of the pre-service teachers who participated in the study, 22% (n=12) stated that the Edmodo application did not have any limitations and they did not offer any suggestions for how to develop the application.

The limitations of using Edmodo

Most of the pre-service teachers who participated in the study stated that Edmodo had some limitations. Table 1 shows the frequencies and percentages of pre-service teachers' views about the limitations of using Edmodo. Some of these limitations included the need for internet access to use Edmodo,

the lack of Turkish language support, certain failures in starting and using Edmodo, the inability to open certain documents in the mobile application and problems with videos not directly uploading on Edmodo.

Table 1. The limitations of using Edmodo according to the pre-service teachers.

Limitations	f	%	Sample of expressions
The need for internet access	14	33	An application that needs the internet is limiting (1).
Lack of Turkish language support	10	23	
Certain failures in starting and using Edmodo	3	7	The limitations are slow uploading times and the lack of language options. Also, some documents do not open in Edmodo (21).
Certain documents not opening in the mobile application	3	7	
Videos not uploading directly	2	5	

Proposals for developing the Edmodo application

Some pre-service teachers participating in the study made suggestions to the developers and users of Edmodo to help remove the limitations of the application and increase the active participation of students in Edmodo. Table 2 shows the frequencies and percentages of the pre-service teachers' suggestions concerning increased availability and the development of Edmodo. Generally, the pre-service teachers suggested that the application should allow users to upload and share videos and photos and that notifications from Edmodo should be sent directly to mobile phones. They also suggested that the application should have Turkish language support. When asked about the use of the application within a real course, they noted that the moderator (the teacher) should participate more in the virtual classroom on Edmodo and the application should be used in other courses included in teacher education programmes. In the study, only a few pre-service teachers offered different suggestions. One pre-service teacher suggested that international participation should be included in Edmodo's virtual classrooms, noting that, "I think Edmodo is more effective if the participation to application is international". Another pre-service teacher commented on the need for statistics concerning comments and posts in Edmodo, stating that, "I think it can be good to see how many and which people read the lesson plans and comments".

Table 2. Suggestions for developing and increasing the availability of Edmodo.

Suggestions	f	%	Sample of expressions
Sharing video	9	31	The feature for uploading videos should be developed (22).
More active moderators	9	31	
Notifications sent directly to mobile devices	5	17	The full application should be translated into Turkish (29).
Full Turkish language support	4	14	Notifications should be sent directly to mobile devices (32).
Use of Edmodo in other courses	2	7	

Views about the use of Edmodo on mobile devices and in the web environment

Most of the pre-service teachers who participated in the study stated that they preferred to use the Edmodo application on mobile devices. The pre-service teachers who preferred the use of Edmodo on mobile devices showed that access to the mobile application should be easier than via the website, that it should allow for the course to be followed actively and that notifications should be sent to mobile devices by email. One pre-service teacher noted that, "Generally I used Edmodo on mobile devices. Because I continuously can get at my mobile phone and I can see the notifications coming by mail". Several pre-service teachers discussed the accessibility of the mobile application: "I used the application on my mobile phone. So I entered the application whenever I wanted"; "I could use the application easily since my phone continuously was near me"; and "I preferred the mobile phone. Because I had possibility to always get at my phone". The pre-

service teachers who preferred to use the Edmodo website on the computer noted that the application worked slowly on mobile devices, that they used a computer more effectively and that uploading and downloading documents on mobile devices was harder than using a computer. For example: "The using of Edmodo in computer was more effective than computer. In mobile phone, sometimes some lesson plans were not opening" and "I preferred to use computer for Edmodo. My mobile data were very slow. So, I had disadvantages for mobile devices". Some pre-service teachers stated that they used Edmodo on both mobile devices and computers, noting that, "I used of Edmodo on mobile devices. I used the computer to upload the documents. I downloaded the mobile application of Edmodo. I looked the posts and comments in the virtual classroom in Edmodo whenever I wanted. Mobile application made easier the following of virtual classroom" and "To access to mobile devices is easier than the computer. But, sometimes there were some problems by uploading the documents. It was a bad thing". As a result, when evaluating the views of the pre-service teachers, it can be said that the primary pre-service teachers believed that the mobile application was more effective than the website because of the accessibility of the mobile application; however, the web environment was considered more effective than the mobile application in terms of uploading and downloading documents.

DISCUSSION

In this study, the Edmodo application was used within a course called "Science and technology teaching", which is included in teacher education programmes in Turkey. The primary pre-service teachers used the Edmodo learning platform to share their lesson plans based on different teaching methods and techniques. They also shared the methods they use for teaching scientific concepts in primary classrooms that they prepared in groups during the implementation process. The pre-service teachers had an opportunity to see and evaluate their peers' lesson plans. After the implementation, the study obtained the pre-service teachers' opinions about the use of Edmodo in order to determine the effectiveness and availability of Edmodo in teacher education. The results were discussed under two main themes: "the effects of using Edmodo on pre-service teachers" and "the availability of Edmodo in teacher education". The researcher created these themes by taking into account the views of the pre-service teachers participating in the study.

The effects of using Edmodo on pre-service teachers: From the results of the study, most of the pre-service teachers presented positive views about the use of Edmodo in their education. Several of the studies included in the literature concluded that students had positive opinions about Edmodo (Balasubramanian, Jaykumar & Fukey, 2014; Ekmekçi, 2016). So, it can be said that the results of the study were in parallel with the results of several other studies included in the literature review. The reasons for this result can differentiate according to the features of students and the aim of usage of Edmodo. In this study, most of the pre-service teachers stated that the Edmodo application had positive effects on pedagogical knowledge, the ability to use technology and the process of collaboration and communication for primary pre-service teachers teaching science. In this course, Edmodo was used as a tool for pre-service teachers to share and evaluate the lesson plans that they prepared with friends in groups and the application was also used as a space for the participants to share their diary entries about the experiences that they gained by practising their lesson plans during the university course and in a real primary classroom. The pre-service teachers stated that they could see the activities based on different teaching methods and techniques and they presented their views by evaluating these activities and reading their peers' feedback. Edmodo provided the opportunity for pre-service teachers to learn about their mistakes via their peers and it allowed them to correct their mistakes in the lesson plans. It was usually met with the studies about the effects and nature of peer-assessment and its contribution to interpersonal interaction (Gennip, Segers & Tillema, 2010). In peer assesment, students learn from each other by means of feedback (Gennip, Segers & Tillema, 2010). The pre-service teachers also pointed out that they gained different perspectives from their peers, that they gained access to their friends' views in the virtual classroom and that they had the opportunity to compare lesson plans by seeing different lesson plans.

For this reason, on the basis of the results of the study it can be said that the courses that teach pedagogical knowledge included in teacher education programmes that are supported by virtual classrooms can help the development of pre-service teachers' pedagogical knowledge. In the study, the pre-service teachers also mentioned the positive effects of the Edmodo application on their ability to use technology. Other studies have also found that the web environment affects users' abilities to use technology and the attitudes toward computer positively (Kumar & Kumar, 2003). In the study, some pre-service teachers stated that they were already successful in using technology and so using Edmodo did not affect their abilities. Edmodo is an open, free, simple and secure online learning platform for students and teachers (Kongchan, 2008). Pre-service teachers in this process carried out simple activities such as uploading and downloading documents, sharing documents and making comments, etc. However, some pre-service teachers stated that their skills in using the web environment and mobile applications developed during the implementation process. In particular, most of the pre-service teachers pointed out the effects of the Edmodo application on their technological pedagogical content knowledge. The pre-service teachers said that they learned how a mobile application is used in education and that they first used such a mobile application within the course involved in the study. It is thought that the reason for these results stems from the availability and use of educational software, such as the Edmodo application, which motivates students to learn and encourages use within an active course in a real classroom environment. In terms of technology acceptance, it is important that pre-service teachers adopt the technology and learn how they will be able to use the technology. As, perceived the capability, the attitude about the using of computer, the self-efficacy of computer use directly affects the technology acceptance of pre-service teachers; perceived ease of use, technological complexity and facilitator conditions indirectly affect technology acceptance (Teo, 2009). It can be said that the use of Edomodo and similar applications in teacher education contributes to pre-service teachers learning new teaching methods and techniques and allows pre-service teachers to understand how these applications can be used in their professional careers. In a similar vein, Baran (2007) has stated that educators expect pre-service teachers to use technology in their professional careers based on their experiences in the course-based web environment in teacher education, in addition to main purposes and advantages. Sadaf, Newby & Ertmer (2012) have pointed out that pre-service teachers should be better prepared for teaching and their beliefs about the use of technology should be developed in order to allow them to use web 2.0 technologies successfully in the K-12 classroom. As a result, this study supports the need for the development of pre-service teachers' ability to use the web environment and mobile technologies in their professional careers by means of the use of simple applications like Edmodo in teacher education.

Social networks such as Edmodo support users' desires to share their interests, establish cooperation, share resources and establish communication and interaction (Hossain & Wiest, 2013; Sohaei & Iahad, 2014). Social network sites provide a space for people who have similar interests to communicate and they empower social relations (Hossain & Wiest, 2013). In the study, the pre-service teachers also stated that they could communicate more comfortably in the online environment than in traditional classrooms, that they could organise their lesson plans in cooperation with friends and that they had the opportunity to explore everyone's views in the classroom. The studies included in the literature stated that the virtual classroom environment helps students to communicate more comfortably. Chen (2013) has stated that virtual learning environments can provide real communication and interaction for learners and can create a comfortable and happy learning atmosphere. Similarly, in a study carried out with Edmodo, most participants stated that Edmodo is a good learning tool in addition to face-to-face discussions and that it provides a good cooperative learning platform for students (Enriquez, 2014). Based on questionnaire data, Yang & Liu (2007) concluded that most teachers and students did not find the virtual classroom to be as valid as a traditional classroom when they used the virtual classroom as the main educational aim. It can be said that virtual classrooms can help students to overcome their anxiety of face-to-face communication and can help them to express their views more comfortably by overcoming their fears of criticism. Accordingly, pre-service teachers can communicate more easily with each other in virtual classrooms in comparison to traditional classrooms. The long implementation process can contribute to strengthening communication and the skills needed to see and critically evaluate events and help users acknowledge different perspectives. The effects of Edmodo can be evaluated with different longitudinal studies.

The availability of the Edmodo application: Mohamad, Salleh & Salam (2015) have stated four motivational factors: ease of use; entertainment; usefulness; and self-confidence. These four factors affect teachers' motivation to use tools as online teaching tools. For this reason, the availability of a website or an application should be evaluated as an important variable. This study obtained results about the availability of Edmodo by evaluating pre-service teachers' views. In the study, the pre-service teachers stated that the Edmodo application had some limitations and they made several suggestions for the development of Edmodo. Some pre-service teachers did not believe there were any limitations and they offered no suggestions about developing Edmodo. The pre-service teachers stated that limited Turkish language support, the required internet access, the inability to open some documents on mobile devices and the inability to upload videos directly to the application were limitations of Edmodo. Enriquez (2014) has also determined that students saw other disadvantages to using Edmodo, such as time consumption, the difficulties in following the procedures of Edmodo, the plagiarising of some studies and the inability for some students to access the internet at all times. Similarly, Ekmekçi (2016) also pointed out in his study that 25% of university students indicated that Edmodo is a slow and complex application that requires continuous internet access. At present, the use of the internet in many countries is not free and unlimited. The results of the study showed that some pre-service teachers do not always have internet access in their homes. The Edmodo application has Turkish language support but does not support Turkish language for the entire application. In the study, some pre-service teachers stated that they are curious about the entire application and want to examine. However, the pre-service teachers did not use the entire application because of their lack of English language skills. Several pre-service teachers stated that the uploading of videos and photos to Edmodo is insufficient in comparison to other social network sites such as Facebook and Twitter. The pre-service teachers offered various suggestions concerning the limitations of Edmodo. They suggested that the Edmodo application should be able to be used offline, that it should offer the opportunity to upload videos and photos directly, that it should allow users to open Word documents and other documents, that it should offer Turkish language support and that it should provide notifications sent directly to mobile devices. In support of this view, Thongmak (2013) has also pointed out that the developer of Edmodo should develop Edmodo's features by competing with other social networks.

In the study, several pre-service teachers made suggestions for the lecturer. They stated that the lecturer should have more of a presence in the virtual classroom and make comments on posts posted by pre-service teachers. Some researchers in various studies have pointed out that students need a moderator in the virtual classroom (Macia and García, 2016; Yang, 2016). According to this result, it can be said that pre-service teachers want lecturers to take control in virtual classrooms, just like in traditional classrooms. In the implementation process of this study, the lecturer only made a few comments to posts at regular intervals and s/he did not interfere in the comments and posts of pre-service teachers. With web technologies, learners can obtain information and do not necessarily have to rely on the teacher. Self-regulated learning can occur in this process, which positively affects motivation (Bell, Urhahne, Schanze & Ploetzner, 2013). It is thought that the pre-service teachers' views on this issue stem from habits they have gained in traditional classrooms. In the study, the pre-service teachers were asked a question about the availability of Edmodo on mobile devices. Most of the pre-service teachers stated that they preferred the use of Edmodo on mobile devices. As reasons for their answers, the pre-service teachers stated that mobile devices are accessible everywhere and they can follow the virtual classroom actively by receiving notifications. Some studies included in the literature review have shown the effects of mobile devices and mobile learning on learning and the different skills of students (Fabian, Topping & Barron, 2016; Hwang, Wu, Zhuang & Huang, 2013; Kuznekoff & Titsworth, 2013; Liu, Peng, Wu & Lin, 2009; Shih, Chuang & Hwang, 2010; Sung, Chang & Liu, 2016). The importance and effects of mobile learning have increased with the development of technology and the development of accessible mobile devices for everyone. It can be said that the Edmodo application is available for pre-service teachers since it has mobile support.

CONCLUSION AND SUGGESTIONS

The results obtained from the study have shown that the Edmodo application, which provides an opportunity to create a virtual classroom, can be used in teacher education for creating connections between

theoretical and practical courses. Generally, the pre-service teachers that participated in the study presented positive views about the effects of using Edmodo on their pedagogical knowledge, their ability to use technology and their skills for establishing communication and collaboration. Enache, Eftimie & Margaritoiu (2010) have determined that only a few teachers use both traditional teaching and educational resources involving the use of the internet to develop their students' independence, curiosity and skills such as critical thinking. Many web-supported environments and applications are available for teachers and students to use. Edmodo is a free and secure social learning network that is suitable for teaching and learning (Hossain & Wiest, 2013). On the basis of the results of this study, it can be suggested that the use of Edmodo in teacher education should be popularised and the application should be introduced to teachers and pre-service teachers. In the study, some pre-service teachers made suggestions concerning the limitations of the application. According to these suggestions, it is thought that the availability of Edmodo will increase if some features are added to the application, including the ability to use the application offline, the ability to directly upload videos, the ability to receive notifications directly to mobile devices and the availability of unlimited Turkish language support. The pre-service teachers stated that Edmodo is more accessible since it has mobile support. These results suggest that the effects of the use of mobile applications in teacher education should be discussed in future research and that there is a need for experimental studies that focus on the use of mobile technologies. Besides, different mobile applications developed only for teacher training can be used in theoretical and practical courses in teacher education program. Pre-service primary teachers have participated in this study. Similar studies can be conducted with pre-service teachers studying in different departments. In the study, a participant pre-service teacher has suggested that Edmodo application should be carried out with international participation. On the basis of this result, it is possible to create virtual classrooms with international participation with pre-service teachers who are studying in the same departments and grade level in different countries, so that pre-service teachers can see different experiences and recognize the education systems of the countries.

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