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I Can Make a Scientific Research: A Course about Scientific Research Methods, in Which Learning Management System (LMS) Is Used

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Abstract

The purpose of this study was to determine the changes in the perception of teacher candidates towards scientific research process and their self-efficacy in this process, during Scientific Research Methods course that has been conducted using "Learning Management System" based on out-of-class learning activities. Being designed as a mixed-model, the research was carried out by using embedded method. Action research model constitutes the qualitative part of the research, whereas descriptive model forms the quantitative part. Sample of the study consisted of 16 teacher candidates, 8 males and 8 females, who were taking Scientific Research Methods course. "Scientific Research Self-Efficacy Scale" was used to find out scientific research self-efficacy perception of teacher candidates. An interview form, consisting of six open-ended questions, developed by the researcher was used to collect qualitative data. As a result of the study, it was found that teacher candidates' perception towards science and scientific methodology changed. At the same time, it was revealed that after the program self-efficacy perception of teacher candidates, who were describing themselves as inadequate before the program, improved changed and teacher candidates felt that they had scientific research ability.

Keywords: nature of science, scientific research, learning management system, instructional design, teacher education

1. Introduction

It is important for elementary teachers to be at a certain awareness level about the nature of science and scientific research process and to have sufficient knowledge and skills in this area (Tatar, Karakuyu & Tüysüz, 2011). The reasons of this importance can be explained by two ways. First, improving children's perceptions towards science and the nature of science is one of the basic goals of the elementary school programs. It can be said that science curriculums are particularly focused on the acquisition and development of these features (MEB, 2013). Second, for teachers, using scientific research knowledge and skills in their life is a way of ensuring the continuity of their personal and professional development. Teachers need these knowledge and skills to solve the problems that they may face and to follow the developments in their profession. Indeed, Ministry of National Education has emphasized the use of scientific research as one of the general qualifications of teachers, for ensuring their personal and professional development (MEB, 2008).

In order to develop the knowledge and skills of teacher candidates about the process of scientific research, undergraduate program has a course called “scientific research methods”. As stated by Karasar (1974), the purpose and content of this course is not raising senior research scientists, it is providing a certain level of research culture and formation to the students and giving them the habit of working to solve problems. Teacher candidates, who graduated by taking a course designed for this purpose, are expected to use these knowledge and skills in their work life and develop them in their students as well. However, researches indicate that teachers do not feel themselves sufficiently competent to conduct a scientific research; in addition, they also have various confusions about science and the nature of science (Büyüköztürk, 1999; Akar, 2007; Ersoy& Çengelci, 2008; Yıldırım, Atila, Özmen & Sözbilir, 2013). Büyüköztürk (1999), emphasized that elementary teachers believes that scientific research capabilities are important, however they don't see themselves having these capabilities. Therefore, it can be said that this course given at undergraduate level has not achieved its goal.

How to give scientific research education to the students at undergraduate or graduate level is a topic of discussion. Some technical knowledge, skills, and affective features about the nature of science and scientific research process are required (Büyüköztürk, 1999; Erdem, 2012; Yıldırım, 2005). In order to develop these technical knowledge, skills, and

affective features and ensure their permanence, it is required to resort to different strategies other than traditional teaching methods and techniques. As Büyüköztürk (1999) pointed out, research education is based on life. A research education that is cut off from life, being attempted to be carried out only in abstract context, will lead to shortcomings in transferring acquired knowledge and skills to other situations.

Many studies, featuring the nature of science and scientific research process, which involve different teaching practices, have been conducted on teacher candidates. In this regard, Kim (1998) used concept maps, Slack (2007) used repeated and guided scientific researches, Aydoğdu, Buldur and Kartal (2012) used scenario-based experimental laboratory applications, Schwarz (2008) used modeling-centered scientific inquiry approach, Shaw, Holbrook, Scevak and Bourke (2008) used project management. In recent years, researches featuring technology, particularly the implementation of e-learning, has been carried out in the area of scientific research education. For example Colon (2010) has performed scientific research education practices by using e-learning approach, whereas Kolaylı (2015) has used technology-supported scientific research model in her study. Colon (2010) and Kolaylı (2015) both emphasized that some changes have occurred on teacher candidates' perception towards the science and the nature of science. In this regard, in order to improve the perception of teacher candidates towards scientific research process and their self-efficacy, Learning Management System (LMS) was used in this study. Learning Management System is a software that integrates teaching, assessment and class management functions (Garrato & Petterson, 2007). Learning Management System provides, to both teachers and students, a virtual environment where the information, opinions, ideas and products are shared and discussed (Lochner, Conrad & Graham, 2015; Venter, van Rensburg &Davis, 2012; Garrato & Petterson, 2007; Schoonenboom, 2014). This technology, which allows teachers and students to continue their interactions free of time and space restrictions, permit to fulfill various interests, needs and developmental characteristics of the students during the learning process. In addition, as pointed by Esmer and Altun (2015), using different teaching methods support the development of mental skills, such as thinking styles. Learning management system is one of these means.

In recent years, especially in the teaching and learning process of higher education, we are facing with learning management system-based applications as a different model. Many researches have been conducted on the basis of this application. Hustad & Arntzen (2013) have created an application by integrating learning management system and social networking technologies; and they investigated the impact of this application on the learning process and the troubles experienced during this process. Although the application has a positive impact on learning and teaching, they have identified some problems in the organization and management, social behaviors, and technical field. Kim (2010) has implemented a learning management system, where students can direct their own learning process and at the end positive developments were observed in students' ability to manage their own learning processes. Stamm (2013) found that there is a significant and strong relationship between students' active participation in the learning management system and their performances. In addition to these practice-based studies, there are also research conducted to identify useful parts and limitations of learning management systems, for both teachers and students. As a result, most emphasized limitations were the problems that are very common in organizational and technical fields, whereas the ability to be able to interact with teachers and students without time and space restrictions was mostly emphasized as the positive side of it (Garrote & Pettersson, 2007; Weaver, Spratt & Nair, 2008; Karaman et al., 2009; Hashim, 2011; Ramirez, 2014; Russell et al., 2014; Sitte, 2015).

The purpose of this study was to determine the changes in the perception of teacher candidates towards scientific research process and their self-efficacy in this process, during Scientific Research Methods course conducted through "Learning Management System" based on out-of-class learning activities. In this regard, the following three questions were addressed:

1. What is the perception of teacher candidates towards science?
2. What is the perception of teacher candidates towards scientific research method and its steps?
3. What is the self-efficacy perception of teacher candidates about conducting a scientific research?

2. Method

Being designed as a mixed-model, the research was carried out by using embedded method. Action research model constituted the qualitative part of the research, whereas descriptive model formed the quantitative part.

Sample of the study consisted of 16 teacher candidates, 8 males and 8 females, who were taking Scientific Research Methods course. Participants were randomly selected among 80 teacher candidates, taking Scientific Research Methods course.

In order to determine teacher candidates' self-efficacy perception towards scientific research, "Scientific Research Self-Efficacy Scale", which has been developed by Tuncer and Özeren (2012), was applied before and after the program.

This scale is a 5-points Likert type scale, consisting of 4 sub-dimensions, namely "*Literature, Methods, Conclusion-Discussion and Suggestion-References"*, and including 12 items. Cronbach alpha coefficient of the whole scale was calculated as .846 (Tuncer & Özeren, 2012).

In order to collect qualitative data, an interview form developed by the researcher, consisting of six open-ended questions, was used. The interviews were conducted with teacher candidates before and after the program. This interview form includes questions such as, "*In your opinion, what is science? What are the stages of a scientific research? Can you design and implement a scientific investigation?".* In addition, journals recorded by teacher candidates to share their experience about learning management system were also used.

During the 10 weeks implementation period of the research, "Learning Management System (LMS)" that provides Turkish language support was used. This LMS allows teachers to create online classes whereby they can store the course materials online; set and manage student groups, manage assignments and exams; grade student works and provide students with feedback all in one place. A big group, including all teacher candidates and 4 smaller groups consisting of 2 female and 2 male teacher candidates were formed within the LMS. Each week, a sub-step of scientific research process was addressed theoretically and with examples within the big group; afterwards teacher candidates have applied this step to their research projects in their smaller groups.

The performance tasks given to teacher candidates were as follows: *"Literature review and problem determination, Problem definition and the scope, Identification of the main objective and sub-objectives, Significance and Limitations of the research and numerical results, Identification of the research model, Identification of the Population and the Sample, Selection of Data Collection Tools and Planning the Operation, Operation Process, Analysis of the Data and Reporting"*. Teacher candidates have carried out discussions and shared these tasks in their groups. Afterwards, each group shared their reports within the big group, which has been formed by the researcher within LMS, and teacher candidates have discussed the reports all together.

Qualitative data obtained during the study were analyzed using content analysis method. In order to ensure intercoder reliability, the formula proposed by Miles and Huberman (1994) was used during the data analysis process (agreement / (agreement + disagreement) * 100). The agreement value of the qualitative data coded by the researcher and an assistant researcher was found to be 0.86. While presenting qualitative findings, teacher candidates are represented by the codes TC1, TC2, etc. For the analysis of quantitative data, normality was tested first to determine appropriate statistical methods. Skewness and Kurtosis values of quantitative data were checked (See Table-1). For normal distribution, having Skewness and Kurtosis values between -1.5 and +1.5 is sufficient for Tabachnick and Fidell (2013), however according to George and Mallery (2010) these numbers should be between -2 and +2. In this regard, it can be said that the data collected in the research were normally distributed. Quantitative data were analyzed through descriptive statistics and paired sample t-test.

Table 1. Skewness and Kurtosis values of the collected data

	Skewness	Kurtosis
Total Pretest	176	,796
Total Protest	-,256	-,657
Literature pretest	-,626	-,491
Literature protest	,445	-1,019
Method pretest	,316	,572
Method protest	-,817	-,350
Discussion pretest	,068	-,881
Discussion protest	-,783	-,912
Suggestion pretest	-,883	1,974
Suggestion protest	-,255	-1,006

3. Results

The outcomes of the research are presented in the framework of three titles.

3.1 The perception of Teacher Candidates towards Science

Before the program, teacher candidates have attempted to explain their perception towards science under four categories (The totality of information, discipline, method and technology), whereas after the program they explained it under three categories (process, the search for truth and system) (See Table 2).

Based on teacher candidates' statements, it can be said that they used to describe science in a narrower sense before the program. Six teacher candidates have described science as the totality of information: "The totality of ordered, systematic information" (TC7), "The totality of proven information, whose reality is accepted by everyone" (TC4), "The totality of information" (TC3).

The other six participants were seeing science as a field, branch or discipline: "It is a branch whose results have the possibility of conveying the absolute truth" (TC11), "It is a discipline that is proven by experience and observation, which is continuously renewable" (TC8), "It is the branch that helps the emergence of the knowledge" (TC2), "It is an area subjecting universal information that can be reached through logic and reasoning" (TC5).

Two teacher candidates characterized science as a methodology: "The method of binding the facts, which are based on observation, to each other through reasoning" (TC1), "It is a method that is questioning, researching, criticizing, producing and describing knowledge in an impartial manner" (TC6).

The other two teacher candidates approached to the science as a practice and limited it with the concept of technology: "It is a complement of practical works that allows us to get better living conditions" (TC10), "All tools and technologies that enable the advancement of the era" (TC14).

At the end of the program, 11 teacher candidates were seeing science as a process: "Science is the process of attaining the reality, the truth" (TC8), "Science is the process of accessing to information" (TC2), "It is the process of accessing to information in a systematic manner" (TC6).

Three teacher candidates have described science as effort: "It is an effort dealing with the facts through reasoning and finding the laws" (TC1), "Science is an effort of searching for the humanity, the universe and the truth" (TC15).

According to two teacher candidates, science is a system: "It is a system that enables the emergence of knowledge through research and examination" (TC4), "It is a set of systems giving information about the essence, status and position of the existence" (TC7).

It can be said that, teacher candidates' perception towards science has been changed as a results of out-of-class activities carried out within the learning management system. Compared to the beginning of the program, teacher candidates perceive science in a more comprehensive form, such as a process or a system, rather than one-dimensional form as the totality of information, method and technology.

Table 2. Teacher candidates' perception about science before and after the program

		Categories	f
Before Program	1.	The totality of information	6
	2.	Discipline	6
	3.	Methodology	2
	4.	Technology	2
		Overall	16
		Categories	f
After Program	1.	Process	11
	2.	Effort	3
	3.	System	2
		Overall	16

3.2 Perception of Teacher Candidates towards Scientific Research Method and Its Steps

Before the program, teacher candidates have attempted to explain their perception towards scientific research method under three main categories (walkthrough/way/path, attitude and process) and eight sub-categories, whereas after the program they explained it under one main category (walkthrough/way/path) and three sub-categories (See Table 3).

Six teacher candidates' have stated scientific research method as the walkthrough/way/path to the solution of a problem: "The walkthrough for the solution of a problem" (TC3, TC12), "The way set out to resolve any problem" (TC9), "A systematic path followed to solve an existing problem" (TC5).

Two teacher candidates characterized scientific research process as a way of reaching new information: "Scientific method is the path fallowed to reach the information" (TC13), "The path fallowed to find out right information" (TC4). TC11 described scientific research method as "the path to finalizing a topic".

Teacher candidates, who saw scientific research method as an "attitude", have stated the followings: "Scientific method is a widely accepted style, carrying the evidence in its nature" (TC8), "It is looking at a subject objectively" (TC2), "The attitude that is taken when conducting a research on a topic" (TC7).

Teacher candidates, who perceived scientific research as the process of achieving the information or the objective, have stated the followings: "Scientific method is a process that allows us to get information" (TC1, TC10), "Scientific research is the process of achieving the objective (TC16).

After the program, all teacher candidates have used the concept of "walkthrough/way/path" while explaining their perceptions towards scientific research method. Ten teacher candidates explained scientific research process as the way

of attaining scientific knowledge: "It is the walkthrough used to acquire scientific knowledge" (TC9, TC11, and TC10), "It is the path followed to reach scientific knowledge" (TC4).

Three teacher candidates were seeing scientific research method as the way of scientific study: "It is the path fallowed in scientific studies" (TC7), "This is the way adopted during scientific studies" (TC15). A teacher candidate (TC3) explained scientific research method as "the road to reality".

Before out-of-class activities carried out within the learning management system, only four teacher candidates (TC13, TC4, TC1 and TC10) have associated scientific research method with accessing information. At the end of the program, the majority of teacher candidates described scientific research method as a path going to knowledge. In this regard, it can be said that, teacher candidates' perception towards scientific research method has been changed as a results of the program.

Table 3. Teacher candidates' perception about scientific research method

	Categories		Sub- Categories	f
Before Program	Walkthrough/ way/path	1.	Problem solving	6
		2.	Seeking knowledge	2
		3.	Topic disambiguation	1
	Attitude	1.	Attitude	1
		2.	Style	1
		3.	Objectivity	1
	Process	1.	Accessing information	2
		2.	Achieving the objective	2
			Overall	16
	Categories		Sub- Categories	f
After Program	Walkthrough/ way/path	1.	Scientific knowledge	13
		2.	Scientific study	2
		3.	Reality	1
			Overall	16

Before the program, when teacher candidates' views about the steps of scientific research method were asked, three teacher candidates answered this question as "I don't know the steps" (TC2, TC8, TC11). Nine teacher candidates associated the steps of scientific research method with the steps of the problem solving process (TC3, TC5, TC6, TC9, TC10, TC12, TC13, TC14, and TC15). This fact explains why before the program six teacher candidates have perceived scientific research method as "the walkthrough for the solution of a problem" (See Table-3). Other teacher candidates used the following statements about the steps: "theory, hypothesis, provision and judgement" (TC4), "Inquiry, research, experiment, hypothesis, etc." (TC16), "Diagnosis and analysis" (TC1), "First a view is suggested. Then this view is tested with experiments. If it is not verified, all starts over…" (TC7).

At the end of the program, ten teacher candidates associated the steps of scientific research method with the steps of the problem solving process (TC3, TC5, TC7, TC9, TC10, TC11, TC12, TC13, TC15, and TC16). Six teacher candidates mentioned the progressive applications carried out during 10 weeks period, which has been explained in the methodology part of the paper, as the steps of scientific research process (TC1, TC2, TC4, TC6, TC8, and TC14).

As explained above, the majority of teacher candidates sustained their initial perception - the steps of problem solving process are also the steps of the scientific research method –after the program as well. In addition, teacher candidates, who did not possess an opinion about the steps of the scientific research method or who have stated different views, changed their views.

3.3 Self-efficacy Perception of Teacher Candidates about Conducting a Scientific Research

The analysis of quantitative data collected before the program showed that teacher candidates' overall self-efficacy perception and their self-efficacy perception in four sub-dimension (Literature, Method, Conclusion-Discussion and Suggestion-References) was as "Hesitant (inadequate)" (See Table-5). In addition, according to the interviews conducted with teacher candidates before the program, none of them felt that they have the ability of conducting a scientific research. They expressed their inadequacy perception as "lack of knowledge and experience" (See Table-4).

Before the program, 12 teacher candidates stated that they could not conduct a scientific research because they did not possess the required information about this process: "I can't conduct a research on my own. Because I don't have enough information about it" (TC4), "I cannot carry out. Because I don't have the knowledge to carry out a scientific research" (TC7), "I cannot. Because I don't believe that I am adequate. I don't think I have so much information" (TC11), "Inadequate. Because at the moment, I don't have enough information to carry out a scientific research" (TC10).

Four teacher candidates stated their inexperience as the reason of not being able to conduct a scientific research: "Not

adequate. Because I don't have the habit of making research" (TC2), "I don't feel adequate for start-up because I've not been interested in science or scientific research before" (TC16), "I cannot carry out a scientific research because I don't have any experience" (TC8), "I don't feel that I'm adequate, because I haven't carried out a study having the qualities of scientific research before" (TC1).

The analysis of quantitative data collected after the program shows that teacher candidates' overall self-efficacy perception and their self-efficacy perception in four sub-dimension (Literature, Method, Conclusion-Discussion and Suggestion-References) became "I agree (adequate)" (See Table-5). In addition, according to the interviews conducted after the program, 11 teacher candidates felt that they have the ability of conducting a scientific research.

Teacher candidates have mentioned "having learned the steps of scientific research method" and "the contribution of the course" as the reasons of the change in their self-efficacy perception (See Table-4). These teacher candidates have emphasized the followings during the interviews: "Thanks to our course, now I believe that I can carry out such a research" (TC3), "I can follow the stages of a scientific research to conduct a study" (TC12), "I frankly think that I can conduct a scientific research. Even though I made minor mistakes, I'm not as ignorant as I was at the beginning" (TC9), "I learned how to carry out a research through the applications that we have practiced during scientific research course. Thus, I believe that I can conduct a simple scientific research" (TC7).

At the end of the program, five teacher candidates have described their self-efficacy perception towards conducting a scientific research as "partly adequate": "During our course, we learned the walkthrough of a scientific research. For this reason, I can perform a scientific research partially with some help, but not entirely" (TC5), "I can carry out a research partly, however I need assistance in some stages, such as data analysis" (TC10), "I can carry out it partly because scientific research is a long-term process, requiring hard working. I might not be so diligent and patient" (TC14).

It can be said that an increase has occurred on teacher candidates' self-efficacy perception of conducting a scientific research as a result of the out-of-class activities that were performed through learning management system. This change is in favor of the scores that teacher candidates achieved from "Scientific Research Self-Efficacy Scale" at the end of the program (See Table-5). This finding, which was obtained as a result of the analysis of quantitative data, overlaps with the finding that teacher candidates' self-efficacy perception, which was "inadequate" at the beginning of the program, became "adequate or partly adequate" at the end of the program.

Table 4. Teacher candidates' self-efficacy perception about conducting a scientific research

	Categories		Sub- Categories	f
Before Program	Inadequate	1.	Lack of knowledge	12
		2.	Lack of experience	4
	Overall			16
	Categories		Sub- Categories	f
After Program	Adequate	1.	Learning the steps	6
		2.	The contribution of the course	5
	Partly Adequate	1.	Need for help	4
		2.	Eagerness	1
	Overall			16

Table-5. Descriptive statistics and paired sample t-test results of teacher candidates' self-efficacy perception about conducting a scientific research

Dimensions	Groups	N	$\bar{X}$	SD	df	t	p
Literature	Pre-test	16	3.35	.865	15	-4.303	.001
	Post-test		4.29	.453			
Method	Pre-test	16	3.41	.645	15	-4.087	.001
	Post-test		4.28	.515			
Conclusion and Discussion	Pre-test	16	3.42	.494	15	-3.292	.005
	Post-test		4.13	.688			
Suggestions and References	Pre-test	16	3.19	.834	15	-3.024	.009
	Post-test		3.81	.814			
Overall	Pre-test	16	3.35	.464	15	-5.243	.000
	Post-test		4.16	.465			

4. Discussion

Before the program, teacher candidates have attempted to explain science with "the totality of information, a discipline, a method or technology", which implies that their perception towards science was one-dimensional. Other researches also indicated that teachers and teacher candidates stated similar views about science. Kim (1998) reported that before the program teacher candidates were seeing science as a pile of knowledge rather than a methodology, and after the

program most of the teacher candidates continued to see it similarly, only some of them have considered science as a way or process for attaining the knowledge. Yetim (1996) stated that 35 out of 97 university students (39%) have defined science as objective or pragmatic. Definitions related to objectivity consisted of the views indicating that "science reveals systematic knowledge; it is an area examining the relations between facts", whereas pragmatic definitions consisted of technological products and technology related issues. Aslan, Yalçın and Ar (2009) have examined the definitions made by the teachers about science; 20.8% of 48 participant teachers have defined science as the totality of information and most of them have confused science and technology. Similarly, Şenel and Aslan (2014) have examined the metaphors that teacher candidates have created about science and they found that teacher candidates have created metaphors describing science as a formation providing benefit (technology–14.11%) and as an incremental formation (the totality of information). Ayvacı and Nas (2010) have found that 27% of 26 teachers have confused science and technology. Buaraphan (2010) has revealed that 54.4% of 101 teacher and teacher candidates believe that technology is science-based and 28.9% believe that science and technology influence each other.

It can be said that, teacher candidates' perception towards science has been changed as a results of out-of-class activities carried out within the learning management system. They experienced a process starting from one-dimensional perception, leading to a more complex formation. At the end, teacher candidates described science as a "system, process, the effort for finding reality and true knowledge". Kim (1998) reported that after carrying out the program through concept maps, some teacher candidates have described science as a "process" or "walkthrough" rather than "the totality of information" as they have done at the beginning. Palmquist and Finley (1997) have worked on teacher candidates' perception before and after a course featuring the nature of science. They reported that before the course, teacher candidates had traditional views such as "science is the set of findings named as scientific knowledge", "the objective of science is finding absolute truths", etc. They emphasized that after the course the views of teacher candidates were transformed to more modern views such as "science is a process", "science is formed by many disciplines and processes", etc. Similarly Tatar et al. (2011) have emphasized that elementary teachers have traditional views about science and scientific process. Kara (2010) attempted to solve teacher candidates' misconceptions about science through a history of science course. Kara stated that at the beginning of the research teacher candidates have confused science and technology, whereas this confusion was solved at the end of the program. In this regard, it can be said that the perception of teachers and teacher candidates towards science can be improved through trainings featuring science and scientific methods.

Regarding the perception of teacher candidates about scientific research method and its steps, it was observed that before the program most of them were seeing scientific research method as "the process of problem solving" and its steps as "problem solving steps". At the end of the program, teacher candidates described scientific research method as "the way of reaching reality or attaining scientific information". However, the steps of scientific research method were still expressed as "problem solving steps", like at the beginning of the program. Palmquist and Finley (1997) have emphasized that some teacher candidates have modern views such as "there is no single method of research", "the method may vary according to the conditions of the scientist", etc. ; whereas some of them have traditional views such as "there is a single method of research", "scientific method is a progressive process", etc. In this study, the views that teacher candidates have expressed before and after the program were similar to traditional views emphasized by Palmquist and Finley. Other researches have also indicated that teacher candidates have traditional views about science and scientific process (Tatar et al., 2011).

The analysis of quantitative findings collected before the program shows that teacher candidates' overall self-efficacy perception and their self-efficacy perception in four sub-dimensions (Literature, Method, Conclusion-Discussion and Suggestion-References) was as "Hesitant (inadequate)". In addition, according to the interviews conducted with teacher candidates, they have described themselves as inadequate and they expressed their inadequacy perception as "lack of knowledge and experience. At the end of the program, teacher candidates' overall self-efficacy perception and their self-efficacy perception in four sub-dimensions (Literature, Method, Conclusion-Discussion and Suggestion-References) became "I agree (adequate)". In addition, according to the interviews conducted after the program, 11 teacher candidates felt that they have the ability of conducting a scientific research. It can be said that an increase has occurred on teacher candidates' self-efficacy perception of conducting a scientific research as a result of the out-of-class activities that were performed through learning management system. This change is in favor of the scores that teacher candidates achieved from "Scientific Research Self-Efficacy Scale" at the end of the program. Büyüköztürk (1999) pointed that elementary teachers believes that scientific research capabilities is important, however teachers do not possess these competencies at desired level. Aydoğdu et al. (2013) have conducted a research with test and control groups, they have identified that after the program scientific research skills of teacher candidates of the test group have improved more than the ones of the control group. Kolaylı (2015) have implemented technology supported scientific research model and he emphasized that teacher candidates' scientific research knowledge levels have increased at the end of the

application. Shaw et al. (2008) have conducted a research with 159 teacher candidates, where they reported that teacher candidates with high self-efficacy towards research, receiving effective consultancy were more motivated for completing their projects and they felt themselves to belong to a research community. Sözbilir (2007) has performed an activity where 76 teacher candidates have carried out a small research project. At the end of the application teacher candidates described this research project as an effective learning activity and they emphasized that their knowledge and skills towards research methods have been improved.

As a result we can say that perceptions of teacher candidates towards science, scientific process and scientific research ability will developed by providing the appropriate learning environments and tasks for teacher candidates. Learning management system is one of this appropriate learning environments. Because by using LMS, teacher candidates find the opportunity to work together not only in classroom but also outside of the classroom. At the same time, LMS provides, to both teachers and students, a virtual environment where the information, opinions, ideas and products are shared and discussed (Lochner, Conrad & Graham, 2015; Venter, van Rensburg &Davis, 2012; Garrato & Petterson, 2007; Schoonenboom, 2014). Based on the findings of this study using LMS, in teacher education, is recommended to improve teacher candidates scientific research and collaborative studying abilities. How the learning management systems can improve cooperative studying skills and change the thoughts and feelings of teacher candidates in cooperative studying process can be more analyzed in future research.

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