A DIFFERENT APPROACH TO THE SCIENTIFIC RESEARCH METHODS COURSE: EFFECTS OF A SMALL-SCALE RESEARCH PROJECT ON PRE-SERVICE TEACHERS

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Abstract:

Selecting and applying appropriate research techniques, analysing data using information and communication technologies, transferring the obtained results of the analysis into tables and interpreting them are the performance indicators evaluated by the Ministry of National Education under teacher competencies. At the beginning of the courses that can meet pre-service teachers' needs of these knowledge and skills, there is undoubtedly the course of scientific research methods. The scientific research methods course (SRMC) has an important mission in the upbringing of tomorrow's researcher pre-service teachers. However, this mission is not possible by considering only theoretical knowledge. At this point, practical-based the research project gains importance. The purpose of this study was to reveal the thoughts of pre-service teachers about a small-scale research project (SSRP) in the scope of a SRMC. The study was carried out with 69 pre-service teachers from the faculty of education of a state university in the north of Turkey. 40 of them were from the department of primary mathematics education and 29 studied in the department of Turkish language education. A five-point Likert-type questionnaire was administered and the participants' responses were evaluated by means of a software for quantitative analysis. The results of the study revealed that doing a SSRP had many positive effects on the pre-service teachers. Indeed, the SSRP provided them the opportunity to transform the theoretical content of course into practice, to understand the nature of scientific research and respect for them, and to gain the courage to do scientific research and to pursue graduate education.

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Keywords: scientific research methods course, pre-service teachers, teacher training, small-scale research project

1. Introduction

The adults can have a sense of research that is very strong compared to children. As an adult we want to understand the world around us, and to give meaning to our life. As researchers consider that the object of their research is superior, has a value that goes beyond them, and deserves all the efforts that they can bring to it, they are very patient about reaching the goal in small steps However, since they mostly believe that they can quickly and effortlessly get what they want, and do not consider taking interest in things that are not immediately visible or within reach, children need to be trained in the subject of science and scientific research (Pernollet, 2016).

The competitiveness of countries in the international arena is measured by their ability to raise individuals who can play an active role in today's social and economic conditions. This situation leads countries to search an educational model which enables to raise individuals who can take the responsibility, solve problem, think critically and innovative, and have advanced decision making skills (MEB, 2017). In order to train this targeted people, countries try to constantly review and improve their education programs. In this context, some courses are excluded from and some others are included in them. The scientific research methods course is one of the results of these efforts.

Undoubtedly, the SRMC is not a course for teachers to only being aware of the concept of scientific research and to understand the role of the researchers who come to their class. This course has also important contributions to teachers' views on scientific research and their acceptance of scientific results (Baştürk, 2013). Since many teachers are sceptical about the information gathered from educational research and consider researcher as an individual who deals with imaginary things rather than reality. It is undeniable that the purpose of the researcher is often not to address the needs of teachers. In the classes, teachers are faced with problems that need to be solved immediately, and most of these problems are so complex that researchers have difficulty in choosing them as a research topic (Robert, Lattuati, & Penninckx, 1999). Many teachers do not believe that the research done will be useful, unless the description and understanding of what is happening in the classroom has practical consequences for the functioning of the classroom. For example, understanding the causes of students' mistakes does not bring about the consequences of correcting them all the time. However, educational research can contribute teachers to teach how to act,

provide them with examples of activities for use in their courses, and help to understand some of the events between them and their students (Robert et al., 1999). The fact that pre-service teachers graduate with this understanding depends on how the courses such as the SRMC are taught most effectively and efficiently.

Together with scientific and technological developments, teaching profession, as all professions, has become the one that requires specialization, and it has become important for teachers to be educated with knowledge, skills and attitudes required by this profession (Eraslan, 2006). As education is a social system, teacher is undoubtedly one of its most important elements. Therefore, the training and selection of well-qualified teacher is a subject to be constantly discussed and studied. Despite the frequent emphasis on the training of researcher individuals in law and curricula, it is difficult to say that research education is sufficient both in terms of content, level and methodology (Karasar, 2009).

Research is an experience that requires doing research independently, and getting the ability to criticize others' research (Simon & Burstein, 1985). Karasar (1974) identifies research education as an education in which it is demanded for everybody, from managers at all levels to senior research scientists, to gain research formation and culture in different levels they need. In Turkey, the SRMC is included in general culture courses and is compulsory in all teacher training departments (YÖK, 2007). This theoretical course of two credits asks pre-service teachers to recognize basic concepts of science, structure of scientific research, methods used in science, research models, universe, sampling, data collection techniques etc. The fact that, in their professional life, pre-service teachers support scientific studies by doing research or contributing to those doing scientific research and benefit from scientific methods in order to solve their problems in class, is also among the objectives of this course. In the literature, there are many studies revealing the positive contributions of the SRMC to students. So, taking this course provides teachers to do more research in their classes, to increase their participation in scientific research and their research self-efficacy levels, and to decrease their research anxiety (Bieschke, Bishop, & Garcia, 1996; Green & Kvidahl, 1990; Lei, 2008; Saracaloğlu, Varol, & Evin Ercan, 2010). On the other hand, many studies report that teachers do not consider themselves as inadequate in doing a scientific research and their conceptions about science and its nature are not very clear (Büyüköztürk, 1999; Çokluk-Bökeoğlu & Yılmaz, 2005; Ersoy & Çengelci, 2008; Valentine, 1993).

1.1 The significance of the study

It is very important that teachers who are expected to teach skills such as research and critical thinking to younger generations are trained by getting these skills. Being a teacher with researcher characteristics has indisputable contributions both to teachers' own individual development and to their students' development (Goodson, 1994). There are studies revealing that research activities are an important factor in actively participating in the research process, in increasing the success, and in acquiring research skills (Bard, Bieschke, Herbert, & Eberz, 2000; Green & Kvidahl, 1990; Sözbilir, 2007). As underlined by İpek, Tekbıyık and Ursavaġ (2010), in the literature, the factors affecting scientific research activities and skills are mentioned as research teaching, personal characteristics and socio-cognitive factors. As teaching profession constantly asks teachers to improve themselves by increasing their knowledge and their teaching qualities, it can be asserted that this will be easier for teachers who earned researcher characteristics.

As mentioned above, the SRMC is a compulsory course in pre-service teacher education. According to Tosun, (2014), it should be carried out as practical rather than theoretical. Furthermore, he adds that we, as educators, have to ensure that the understanding of teachers as researchers is adopted by pre-service teachers, and teacher training programs should draw attention to the importance of educational research. Indeed, in this way, it can be provided for pre-service teachers to understand the importance of educational research and to obtain a positive attitude towards them.

As there are studies showing that scientific research culture and needs are not sufficiently developed in teachers in-service and that their way of reaching scientific knowledge are limited only to media (İpek et al., 2010), it is not facile to say that pre-service teachers are well trained with knowledge and skills that will lead to this understanding. In order for pre-service teachers to really understand what a scientific research is, we think that they should definitely live the research process. In this context, Sözbilir (2007) highlights that pre-service teachers should meet scientific research throughout their pre-service education, and conduct small-scale research projects in order to improve their skills for following educational research, developing their level of understanding, and putting into practice.

The purpose of this study was to investigate the pre-service teachers' perspectives of a small-scale research project (SSRP) in the scope of SRMC. The results of the study can serve improving the processing of this course and thus the training of researcher-teachers.

2. Method

In the study, we conducted a survey research design to investigate the pre-service teachers' perspectives of a SSRP. In this kind of research design, researchers should not manipulate the conditions experimentally. Accordingly, their mission is not to explain the cause and effect such as experimental research (Creswell, 2012). Thus, through a Likert-type questionnaire and an open-ended questionnaire, the participants were asked to simply exhibit their views on a SSRP without being influenced them in any way.

2.1 The participants

The study was conducted with pre-service teachers who were enrolled in the faculty of education of a state university in the north of Turkey. A total of 69 pre-service teachers participated in the research. Their distribution was as follows: 40 from the department of primary mathematics education and 29 from the department of Turkish language education. Both groups were in the second year of their university education. The distribution of the participants by sex was 20 males and 49 females.

In the first hour of SRMC, the pre-service teachers were asked to select one of the subjects of research determined by the instructor (at the same time the researcher) and to form a research group of 3 or 4 persons. The theoretical content of the course were lectured by the instructor in two hours of course per week. Furthermore, every week in out of class time each research group should meet the instructor who also took a role of supervisor.

2.2 Data collection and analysis

To determine their perspectives of the SSRP, we administered a five-point Likert-type questionnaire to the pre-service teachers. The obtained responses from the questionnaire were evaluated through a software for quantitative analysis, by scoring the items as 5 for strongly agree, 4 for agree, 3 for neither agree nor disagree, 2 for disagree, and 1 for strongly disagree. The gap width of the questionnaire was formulated with line width/the number of the groups. In the evaluation of the results of the questionnaire; the gaps of arithmetical average were like this: '1.00-1.80' = 'strongly disagree'; '1.81-2.60'= 'disagree'; 2.61-3.40' = 'neither agree nor disagree'; '3.41-4.20' = 'agree'; 4.21-5.00 ='strongly agree'.

In the choice of items, two factors played a main role: a literature review (Polat, 2014; Sözbilir, 2007; Tosun, 2014 etc.), and an open-ended questionnaire. The open-ended questionnaire included one question having five sub-questions. It was

administered to 61 pre-service teachers by asking them to write their opinions and feelings about the SSRP. The aim of the sub-questions was to reveal the effects of the SSRP on the pre-service teachers' attitude towards scientific research, and on their belief that they can do a scientific research, the gains and losses of the SSRP, the SSRP process (assignment of the research projects, creation of research groups, and interviews with the supervisor etc.) and pre-service teachers' recommendations for improving the SSRP process. The pre-service teachers' written responses were analysed and this analysis contributed to determine the Likert-type questionnaire items. In the results section of the paper, some quotations from the open-ended questionnaire will occasionally take place.

The arithmetic mean values of the items were calculated and the comments were built on them. The construct validity of the questionnaire and the factor structure of items by performing principal components method and varimax rotation were tested. Since the factors are independent, the orthogonal rotation is often used in social sciences due to its easy interpretation, and varimax is one of the most frequently used techniques of the orthogonal rotation (Büyüköztürk, 2017), principal components method and varimax rotation were used. The total number of items in the questionnaire was 22. The reliability coefficient of the Likert-type questions was calculated and found as 0.86 (Cronbach's Alpha). To establish the content validity of the questionnaire, a panel of three educators having a doctorate of education studied the items and determined whether they were appropriate for measuring pre-service teachers' perspectives of the SSRP. The items were re-viewed in line with the suggestions from the panel.

At the end of the factor analysis, six factors were identified. In order to determine how many factors to retain, we used a common criterion basing on the selection of factors whose eigenvalues are more than 1.0. All of the factors explained 67.495% of the total variance. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was calculated as 0.75 and the Bartlett test was significant (i.e. a significance value of less than 0.05). This indicates that the variables were correlated highly enough to provide a reasonable basis for factor analysis (Sipahi, Yurtkoru, & Çinko, 2010). It is possible that the significance of the Bartlett test is considered as a proof of normality of scores (Büyüköztürk, 2017).

As with many data collection tools, closed-ended questions (dichotomous, multiple choice and rating scale) have advantages and disadvantages. They are very useful for scoring objectively and assessing easily. They also permit to compare the respondents each other. However, they are less valid for measuring some skills such as mathematical proving skills or Turkish composition writing skills (Baştürk, 2014). As

indicates Oppenheim (1992), in closed-ended questions respondents cannot add any remarks, qualifications and explanations to the categories and this might pose a risk that the categories might not be exhaustive and that there might be bias in them. To minimize this risk, the pre-service teachers' responses to open-ended questions were also took place in the paper.

Factors loadings, eigenvalues, variance percentages and Cronbach's Alpha coefficient of the factors, were displayed in Table 1:

Table 1: Factors Structure of Questionnaire, Items and Factor Loading (N=69)

Factors and variables	Factor Loading	Eigenvalue	Variance	Alpha coefficient
Factor 1: Contributions of the SSRP ($\overline{X}$=4,24)		6,357	28,893	,878
The research project is useful.	,857			
The research project is instructive.	,803			
The research project motivated me my profession.	,716			
The research project provides me to learn by doing and living.	,707			
I think I learned new things through the research project.	,674			
The research project positively affected my scientific research perspective.	,662			
The research project gave me a sense of responsibility.	,654			
I started to be in more objective judgments through the research project.	,573			
Factor 2: Understanding that scientific research is not so difficult ($\overline{X}$=3,67)		2,474	11,247	,771
Through the research project, I realized that it was not so difficult to conduct scientific research.	,827			
Scientific research no longer intimidates me.	,778			
If I had the opportunity, I would like to do such a research project again.	,760			
Factor 3: Feeling oneself important ($\overline{X}$=4,08)		1,921	8,733	,726
The research project made me feel important.	,757			
The research project made myself feel like a teacher.	,716			
I think the supervisor's influence during the research project was too much.	,623			
I like the scientific research methods course.	,616			
Factor 4: Respect for scientific research ($\overline{X}$=4,32)		1,522	6,918	,564
Through the research project, I learned that	,726			

scientific research should be more respected.				
The research project gave me different perspectives.	,640			
The research project increased my belief that I could conduct a scientific research.	,600			
Factor 5: Increase in workload ($\bar{X}$=3,96)		1,341	6,096	,632
The research project increased my workload.	,839			
I saw that it was a more difficult process to conduct the research project than I thought.	,818			
Factor 6: Having adequate benefice from the supervisor ($\bar{X}$=3,73)		1,234	5,608	,608
I adequately benefited from the supervisor throughout the research project.	,827			
The research project motivated me to do a master's degree.	,718			

Principal components factors with varimax rotation p< 0.000

Keiser-Meyer-Olkin Measure of Sampling Adequacy: .746 Barlett's Test of Sphericity: 231

As displayed in Table 1, we had six factors which explain 67.495% of the total variance. We entitled the factors by considering their factor loadings and variables contained. For example, we grouped factor 3 under the name "feeling oneself important" and refers that the pre-service teachers feel themselves important, as a teacher or a thesis student who studies with a supervisor during the SSRP. This factor with 3 variables had high factor loadings (0.62-0.76) and explained 8.73% of the total variable. Factor 2 was grouped under the name "understanding that scientific research is not so difficult" and included pre-service teachers' perception of difficulty in conducting a scientific research. This factor with 3 variables had factor loadings varying between 0.76 and 0.83, explained 11.247%, and with the first factor, 19.977% of the total variance.

3. Results

In this section, the obtained results of the questionnaire were introduced. Mean and standard deviation of items were displayed in Table 2.

Table 2: Mean and Standard Deviation Value of the Items

Items	Mean	Std. Dev.
Factor 1: Contributions of the SSRP ($\bar{X}$=4,24)		
The research project is useful.	4.41	0.693
The research project is instructive.	4.38	0.730
The research project motivated me my profession.	4.20	0.901

The research project provides me to learn by doing and living.	4.22	0.802
I think I learned new things through the research project.	4.32	0.795
The research project positively affected my scientific research perspective.	4.12	0.814
The research project gave me a sense of responsibility.	4.38	0.621
I started to be in more objective judgments through the research project.	3.91	0.818
Factor 2: Understanding that scientific research is not so difficult ($\overline{X}$=3,67)		
Through the research project, I realized that it was not so difficult to conduct scientific research.	3.49	1.133
Scientific research no longer intimidates me.	3.88	0.867
If I had the opportunity, I would like to do such a research project again.	3.64	1.043
Factor 3: Feeling oneself important ($\overline{X}$=4,08)		
The research project made me feel important.	4.14	0.692
The research project made myself feel like a teacher.	4.26	0.741
I think the supervisor's influence during the research project was too much.	4.16	0.933
I like the scientific research methods course.	3.77	0.731
Factor 4: Respect for scientific research ($\overline{X}$=4,32)		
Through the research project, I learned that scientific research should be more respected.	4.58	0.526
The research project gave me different perspectives.	4.23	0.667
The research project increased my belief that I could conduct a scientific research.	4.14	0.791
Factor 5: Increase in workload ($\overline{X}$=3,96)		
The research project increased my workload.	3.94	1.013
I saw that it was a more difficult process to conduct the research project than I thought.	3.99	1.036
Factor 6: Having adequate benefice from the supervisor ($\overline{X}$=3,73)		
I adequately benefited from the supervisor throughout the research project.	3.94	0.856
The research project motivated me to do a master's degree.	3.52	1.196

As displayed in Table 2, it is seen that in all factors the average is above 3.5. Two factors (factor 1 and factor 4) fell into the interval "strongly agree" and while all the rest fell into the interval "agree". In terms of the arithmetic means (next to each factor in brackets), the factors "respect for scientific research" and "contributions of the SSRP" have the highest averages 4.32 and 4.24 respectively. On the contrary, the factors "understanding that scientific research is not so difficult" and "having adequate benefice from the supervisor" have the lowest averages 3.67 and 3.73 respectively. These results indicate that the contributions of the SSRP to the pre-service teachers are quite positive and at the same time, through the research project, there are significant positive changes in their points of view on scientific research. The pre-service teachers were satisfied with the role of the supervisor in the process of the research project, but it can be said that this role is open to further development. On the other hand, another phenomenon we consider from these results is that the SSRP softened the pre-service teachers' belief that scientific research is very difficult.

When the items of the factors are respectively analysed in more detail, in the factor 1, we consider that the SSRP has a lot of benefits for the pre-service teachers. So, the pre-service teachers find the SSRP as useful ($\overline{X}$=4.41) and instructive ($\overline{X}$=4.38). At the same time, they indicate that the SSRP gives them a sense of responsibility ($\overline{X}$=4.38), helps to learn new things ($\overline{X}$=4.32), to learn by doing and living ($\overline{X}$=4.22), motivates them their profession ($\overline{X}$=4.20), and positively affects their scientific research perspective ($\overline{X}$=4.12). This is supported by the open-ended questionnaire comments, as illustrated below:

"We encountered the teachers in the schools we went to. It was very difficult to get permission for our questionnaire. I also conducted this questionnaire in the city where I live. In fact, being in communication and interaction with many people, improved and honoured me. When conducting the questionnaires, as if we were like a teacher. It seemed as if we were doing an exam in our own class. Through this SSRP, I learned to make an effort and sacrifices. In every free time, we made somethings related to the research project and sometimes we sacrificed sleeping. However, I am happy to get and to do this research project and I do not think that it made me lose something" (Primary Mathematics Pre-service Teacher 1).

"Until now I have not worked on such a formal research topic before or after class. Thanks to the research project, I got more information and I learned new things. This helped me to positively get experience and increased my interest in scientific research. I believe that the research project contributed me to apply, what I learned in class, to everyday life" (Turkish Language Pre-service Teacher 1).

"The impact of the research project on my attitude to scientific research was really very well. By the word "well", I would like to say that we started to evaluate some judgments and considerations which pass in a basic everyday life conversation with many different perspectives. So, I am differently approaching now to judgments whose comments vary from person to person. In order to see how many different perspectives on a subject I can find, in different environments I ask questions such as those of a questionnaire or interview. Which answers will be given by people with certain characteristics or which people will give answers with certain characteristics?" (PMPT3).

The first comment clearly expresses although the research project process was difficult, the pre-service teacher was very pleased. In fact, she indicates that because of the research project, they had to make a great effort and sacrifice sleeping, but thanks to

it, she felt herself like a teacher and found the opportunity to communicate and interact with many people. From the second comment, we understand that such a research project was a first experience for the pre-service teacher. The research project increased his interest in scientific research and provided him to learn new things and to practice his theoretical knowledge. The last comment underlines the contributions of the research project to having different perspectives. The pre-service teacher states that through the research project, she began to assess even a simple event in everyday life by considering different perspectives.

The items of the factor entitled "understanding that scientific research is not so difficult" indicate that the pre-service teachers are not afraid of scientific research anymore ($\overline{X}$=3.88), they are eager to do such a research again ($\overline{X}$=3.64) and through the SSRP, they understand that conducting a scientific research is not so difficult ($\overline{X}$=3.49). The following extracts are typical of such comments:

"After this research project, my perspective on scientific research changed. Now, I respect them and I am aware of their importance. I saw that the difficulties of conducting a scientific research in today's conditions. Everybody did not respect the studies done or some school administrators did not want to allow us to conduct questionnaire or interview. All of this showed us how difficult the scientific research process is. For instance, we could conduct our interview with only a familiar teacher. Yes, now I am more aware of these difficulties and I can maybe do a master's degree in the future. Now I trust myself in this subject. Thanks to this research project, we found the opportunity to practice what we learned in the class and this increased the permanence of our learning" (PMPT27).

"The research project forced me at some stages and I came to the point of hating the scientific research methods course. However, at some stages, as I was very excited and enjoyed, I said that fortunately we were taking this course. My belief that I can conduct a scientific research increased with the interview and questionnaire we did, because I could not dare anything like that before. Now I am more courageous. If I will do a scientific research one day, I think that I will easily do it thanks to this practice" (PMPT23).

"I had the thoughts that scientific research was very difficult and I couldn't conduct a scientific research yet. However, if I am interested in and curious about the subject, if I use true techniques and if I act by knowing what I make, I believe that I can achieve it and improve myself" (TLPT25).

In the first comment, we consider that the research project process really has a positive impact on the change of perspectives on scientific research. The pre-service teacher learns the difficulty of collecting data in scientific research by living and seeing it personally. These difficulties lead her and her group to study with only familiar teachers. But all of them encourage the pre-service teacher to do graduate study. She also underlines the role of the research project in transferring theoretical knowledge into practise. The next comment reveals that some stages of the research project annoy the pre-service teacher and some others please him a lot. The conducted interview and questionnaire help him to gain self-confidence in his ability to conduct a scientific research and he thinks about using this experience in his future career plan. The last comment reveals a positive change of point of view about scientific research. It seems that her experiences during the research project process changed the pre-service teacher's belief that scientific research is very difficult.

Regarding the items of factor 3, they indicate us that the SSRP helps the pre-service teachers to feel as a teacher ($\overline{X}$=4.26), and important ($\overline{X}$=4.14). On the other hand, according to the pre-service teachers, the supervisor plays a more active role in the research project process ($\overline{X}$=4.16) and the scientific research methods course is loved by the pre-service teachers ($\overline{X}$=3.77).

"I learned new things I did not know and I found opportunity to relearn what I studied in the courses in detail. When conducting the questionnaires, I felt like a teacher myself. As students-there considered me the one who will be a teacher, I was honoured to be there and I tried to act like a teacher. Thanks to the research project, I gained experiences and I comprehensively saw how to conduct a scientific research" (TLPT1).

"Thanks to this SSRP, I feel myself important. I conducted the research with great seriousness and importance. If there was more time, I could do a much better research. Studying with group was well, but according to me, the fact that the group size was high prevented them from working more efficiently, because reaching an agreement was often difficult. I think that if I was alone or the number of group member was two, I could do better research. From the interviews conducted with teachers, I learned a lot. At the same time, I understood that being a teacher was too difficult and I had to work harder. As a result, doing this research project was enjoyable" (PMPT20).

"For us, the research project process was intensive and passed in the form of a continuous cooperation. It was a bit difficult, but enjoyable. For instance, we went to schools for the

questionnaire and I felt myself like a teacher. I do not change this experience with nothing" (PMPT21).

The first comment highlights the role of the research project in transferring theoretical knowledge into practise. Furthermore, what the pre-service teacher experienced in the schools helps her to feel as a teacher, to be happy and honoured. She also adds that the research project contributes her to understand how to conduct a scientific research. In the second comment, after the pre-service teacher suggests that she feels important in the research project process, she complains about the group size. According to her, studying with a large group has some difficulties such as not reaching an agreement. The research project process also helps her to understand that teaching profession is very difficult. The last comment describes the research project as being an intensive and cooperative process. The pre-service teacher indicates that it is exhausting, but amusing. As in the first comment, the role of the research project in feeling like a teacher is also underlined.

By taking into account the items of factor 4, it can be asserted that the SSRP increases the pre-service teachers' respect for scientific research. Thus, they think that scientific research deserves more respect ($\overline{X}$=4.58). At the same time, the SSRP helps them to gain different perspectives ($\overline{X}$=4.23) and increases their belief that they are able to conduct a scientific research ($\overline{X}$=4.14).

"In the research project process, we did works we have never done before. When preparing the questionnaire, I learned methods and ways to be followed, I got more information about the literature review and we saw how to benefice from this literature review for our study. I experienced the privilege of working with a supervisor. I benefited from his knowledge and experiences at the optimum level. I do not think that there is a thing I lost" (TLPT4).

"Personally I never thought I could do a scientific research. I still have no such idea, but the research project we conducted allowed us to look at the SRMC from a different perspective. That was nice. I understood very well that scientific research is conducted with what difficulties and they should more be respected" (PMPT5).

In the first comment, the pre-service teacher qualifies the research project as a process in which new things are learned and experienced, and describes what they did in its steps. He is also aware of the importance and privilege of working with a supervisor. The next comment indicates that the research project contributes the pre-

service teacher to consider the difficulties in conducting a scientific research. Therefore, she thinks that they deserve respect.

On the other hand, from the results of the items of factor 5 we remark that the SSRP increases the pre-service teachers' workload ($\overline{X}$=3.94) and leads them to consider that conducting a scientific research is more difficult than they thought ($\overline{X}$=3.99).

"As I have an aim such as doing a master's degree in the future and as I will have to be interested in this kind of things, the research project process turned into a preparation stage for my career plan. The research project process provided me to gain enough experience in this regard. Furthermore, the process of conducting questionnaire, preparing a research project dossier and presenting it increased my self-confidence. Only one negative thing I can say about the research project is that it took too much time. Conducting the SRMC with other seven courses, as this course requires a lot of performance, was very hard. For the first time in my student life, I did such a research project on an original subject outside the course. This made me feel that I entered in the academic life" (TLPT15).

"My thoughts about the literature review of a research did not change much. Through the research project we conducted in the scope of this course, I only clearly understand that conducting a research in Turkey is very difficult due to the lack of sufficient studies in Turkish literature" (PMPT2).

"In fact, when the research project was given, I first thought that it would be enjoyable and easy. However, it was more difficult than I thought, and it really forced me. If there is not a compulsory homework, I will never attempt to do such a work again" (PMPT6).

In the first comment, the pre-service teacher mentions her future career plans and says that the research project provides important contributions to this regard. On the other hand, according to her, the only negative side is that the research project requires a lot of time. The research project gives the feeling that the pre-service teacher stepped into the academic life. In the next comment, the pre-service teacher draws attention to a known problem. This is the lack of sufficient studies in Turkish mathematics literature. It seems that this situation created a serious problem in the stage of literature review for the pre-service teacher. The third comment reveals that the pre-service teacher's initial thoughts on the simplicity and enjoyableness of the research project changed in stages. She admits that she would not want to do such a research project if there was a non-obligation.

Regarding the items of factor 6 related to the supervisor, the pre-service teachers indicate that they adequately benefited from him throughout the SSRP ($\overline{X}$=3.94) and he motivated them to do a master's degree in the future ($\overline{X}$=3.52).

"This SSRP we did in the SRMC affected me and gave confidence in making an academic career. Furthermore, in the process of this research project, we went according to a certain order and rule and there was a supervisor who controlled all our steps. As a result, I was very happy and motivated as long as the research we conducted was successful" (PMPT3).

"Before, doing a master's degree was frightening me and I was exaggerating it. However, now if I work meticulously and seriously, I think I will successfully do it without any difficulty. Organizing this course both theoretically and practically provided us with very nice contributions. Furthermore, I think as we learned the topics of the course by doing practices, what we learned will be more permanent" (TLPT2).

"As the choice of research topics was at our initiative, we chose ourselves the topic we wanted to investigate. Thus, we did not have to choose the one we did not want to investigate. The creation of research groups by ourselves was another subject which facilitated our job. Interviews with the supervisor were the part that I liked and enjoyed most and I think that they passed very well. Our supervisor was very helpful to us with his correct guidance, interest and experiences" (TLPT6).

"If the number of supervisor increases and if one supervisor is assigned to one group, then the supervisor can allocate more time to and concentrate on the research of one group" (TLPT13).

"The process of the research project was quite productive. Even if there were sometimes confusions, in the interviews the supervisor guided us in the best way. However, the time of interviews could have been a little longer" (TLPT17).

The first comment reveals that the research project motivates the student teacher to make an academic career and working under the surveillance of a supervisor in the framework of certain rules makes him happy. In the second comment, it seems that the pre-service teacher exceeded her worries about doing postgraduate education through her research project and realized how serious and rigor scientific research is. Moreover, the fact that the course was conducted both theoretically and practically in this way is

considered as positive by the pre-service teacher. In the next comment, the pre-service teacher indicates that they were free to choose research topics and group members. According to him, this positively motivated them. On the other hand, it seems that the pre-service teacher is also quite satisfied with working with the supervisor. Contrary to the previous comment, the fourth comment reveals the complaints of a pre-service teacher about the inadequacy of a single supervisor. She says that it would be better to have a supervisor for each group. The last comment underlines the supervisor contributions to the research project process, but like the previous one, it criticizes that the supervisor could not take enough time for each group.

4. Discussion

In the present study, the pre-service teachers' perspectives of a SSRP within the scope of SRMC were identified with the help of a questionnaire, which was administered to 69 second grade pre-service teachers. It is very imperative that throughout their teacher training pre-service teachers should be well-equipped with the researcher teacher skills for carrying out small-scale projects, following educational research, developing their level of understanding and transferring into practice (Sözbilir, 2007). Thus, we think that the results of the present study will contribute to the process of researcher teacher training in this regard.

The results of the study revealed that one of the most important contributions that the SSRP makes to the pre-service teachers is to increase their respect for scientific research. Really, through the research project, they look at the events in their surrounding by different perspectives, they believe now that scientific research should be more respected, and they trust themselves more in the manner of doing a scientific research. These results are in agreement with the results of many studies that demonstrated the positives effects of SRMC or doing a small-scale research project on pre-service teachers. For instance, Tosun (2014) revealed that the pre-service teachers who took the SRMC had decreased levels of anxiety towards doing scientific research. In the same way, in their study, Bökeoğlu and Yılmaz (2005) reported that the students' participation in a research activity before influenced in their self-confidence positively, but did not have any effect on their research anxiety.

This study determined that the SSRP provided many benefits to the pre-service teachers such as: being useful and instructive, giving a sense of responsibility, learning by doing and living, and learning new things, getting motivation for being teacher and affecting positively scientific research perspectives. It is evident that the SSRP plays a very important role that the pre-service teachers transform the theoretical contents of

the course into practice. So, in one way, it contributes the pre-service teachers to learn by doing and living. As well indicated by Schank, Berman and Macpherson (1999), "there is only one effective way to teach someone how to do anything, and that is to let them do it" (p. 164). Tomakin (2007) underlines that in the SRMC, it is not sufficient that pre-service teachers are trained by theoretically adopting the conception of researcher-teacher, and moreover when they started doing their profession, they have to make this conception a lifestyle and to constantly research and investigate in the schools where they work. It can be asserted that the SSRP was a very important experience for the pre-service teachers in the context of acquiring the skills of researcher-teacher. Another important contribution to the pre-service teachers of the SSRP is to provide them to feel important and like a teacher themselves. Throughout the SSRP process, the pre-service teachers went to schools to gather data, interacted with teachers and students, and administered questionnaire and interviews.

The pre-service teachers indicated that the supervisor took a more active role in the research project process. There were many reasons for this. The most fundamental reason was the limited time. On the other hand, the pre-service teachers' experience of doing scientific research was also very limited. It should be noted that most of them did not seem very disturbed by this dominant role of supervisor. On the contrary, they were happy to meet with the supervisor face-to-face in his office every week. This was a working style which they have never encountered so far and made them feel important. As it was also a preliminary preparation for doing a graduate degree for them, the pre-service teachers may have feel important themselves. Furthermore, the pre-service teachers indicated that they adequately benefited from the supervisor throughout the SSRP and the SSRP motivated them to do graduate degree in the future.

On the other hand, the SSRP led the pre-service teacher to understand that doing a scientific research is more difficult that they thought. Really, developing a data collection tool, going to schools in order to conduct it, analysing and interpreting the gathered data and transforming the findings into tables and graphics were the tasks which take a lot of time and should be finished in 14 weeks. When we take into account their other courses and research project in this process, it is quite normal that the pre-service teachers were tired of excessive workload because of the SSRP. The fact that the pre-service teachers understood how difficult is doing scientific research, can be considered as positive, because this awareness has the potential to make them more respectful towards scientific research. As already mentioned above, this was also expressed by the pre-service teachers themselves. As underlined by Tosun (2014), pre-service teachers should be trained by having the understanding of teachers as researchers, and the teacher training programs should draw their attention on the

importance of educational research. This will facilitate them to adopt this understanding and to have positive attitude towards educational research.

5. Conclusion and Recommendations

Investigating how the pre-service teachers' perspectives influenced a SSRP experienced by means of a SRMC was the focus of this paper. In brief, the present study revealed that doing a SSRP had many positive effects on the pre-service teachers. Indeed, the SSRP provided them the opportunity to transform the theoretical content of course into practice, to understand the nature of scientific research and respect for them, and to gain the courage to do scientific research and to pursue graduate education.

In the context of the results of the study, the following recommendations can be mentioned:

- The SRMC is a theoretical course with two credits in the present teacher training programs. The fact that pre-service teachers conduct a scientific research in the scope of this course is entirely at the initiative of the instructor. The theoretical contents of the course will already fill this two hours of weekly. For this reason, the credit and weekly course hours of the SRMC should be increased, even the course can be extended to two semesters.

- Some courses in the teacher training programs can be divided into small groups on the ground that they are based on practice. In our opinion, the SRMC is also one of such courses. To be able to do more qualified studies and to benefit more from the supervisor, it can be provided for pre-service teachers to take this course, for instance, in groups of 8-10 persons.

- Currently, the SRMC takes part in the 3rd semester of the teacher training programs. We think it is too early. To plan and conduct an effective the research project in their own discipline, pre-service teachers should be equipped with content knowledge and pedagogical content knowledge (Shulman, 1986, 1987). However, until this semester, pre-service teachers have took very few courses in this regard. Therefore, the course can be scheduled for the 5th or 6th semester.

- This study was mainly designed with a quantitative approach and limited to two departments from a single university. Furthermore, the sample size can be considered as small. The further studies which include a larger sample from other departments and universities can provide confirming the obtained data and better identifying pre-service tectiers' perspective on doing SSRPs.

- On the other hand, the present study revealed general results on the research subject, and therefore the contributions of the SSRP to pre-service teachers'

content knowledge and pedagogical content knowledge were not investigated. By adopting different research designs, more qualitative results related to the subject can be reached, and thus the details of the big picture can be seen better.

- The present study revealed that there were some positive changes in the pre-service teachers' views towards scientific research thanks to the SSRP, but we identified it by only using a questionnaire, not a scale with one group pre-test post-test research design. In the relevant literature, there are many studies on different level students' research anxiety or attitudes towards scientific research (Korkmaz, Şahin, & Yeşil, 2011; Lei, 2008; Saracaloğlu, 2008; Yılmaz & Çokluk, 2010). By using such data collection instruments, the further research can investigate the impacts of pre-service teachers' participation to the research projects such as the SSRP on their research anxiety and attitudes.

Acknowledgements

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