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Effectiveness of the project writing training developed for pre-service primary teachers

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Article Info	ABSTRACT
	The study investigated the effectiveness of the project writing training developed and implemented for pre-service primary teachers. A case study was adopted in the research. The participants of the study were 17 students of the department of primary school teaching at nine different universities in Turkey. In this context, an online project preparation training was given to participant pre-service primary teachers. The prepared training was presented to pre-service teachers as theoretical and practical. At the end of this process, pre-service teachers were provided to prepare project proposals under the guidance of academic consultancy. A semi-structured interview form developed by the researchers was used to collect the research data. The obtained data were subjected to descriptive and content analysis. Within the scope of the research, it was determined that the participant pre-service teachers had positive opinions about the planning of the developed education and its contribution to them. It was concluded that some of the participants had negative opinions about the duration, timing and onlineness of the training.

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1. INTRODUCTION

Teachers have a great influence on the training of qualified individuals. Teachers can be seen as people who contribute to the development of students and are role models for the development of students as versatile individuals. Teacher quality and teaching quality are closely related, and teaching quality is the most important indicator of teacher quality [1]. A highly qualified teacher has the ability to best manage the teaching process and design the best instruction for their students. In addition, these teachers are knowledgeable about learning and make informed decisions not only with their classroom and school evidence, but also with theory and research [2]. For this reason, teachers need to be open to innovations, develop themselves professionally and integrate the changes in education into their teaching-learning process. In addition, teachers should also have the skills of planning, managing and solving problems to deal with problematic situations they encounter. The pre-service training of teachers and the studies they have done contribute to their ability to demonstrate these competences in their professional life.

Globally, teacher education programs have a responsibility to give prospective teachers the best prerequisites for working as teachers [3]. Providing teachers with a scientific research skill before starting their profession can also be considered as an aim of these programs and an indicator of qualified teaching. When teachers do not have sufficient experience and knowledge, they cannot make use of the scientific project preparation process effectively [4]. In this regard, it can be said that a project work that pre-service

teachers will carry out during their undergraduate education will contribute to their mastery of the necessary professional knowledge, skills and competences in the pre-service period.

A project is generally defined as a set of activities with a definite start and end point, with a clearly defined purpose, scope and budget [5]. Thomas, states that the project includes the tasks of identifying a problem, creating a design, solving a problem, making a decision, collaborating and coming up with a tangible product or presentation [6]. Project works enable individuals to produce an original product on real-life tasks that require higher-order thinking skills such as researching, problem solving and using what they have learned [7]. Creswell defines research projects as steps used to gather and analyze information to understand any problem or issue [8]. Through project works, students are guided to explain ideas to others, organize results, make predictions, answer questions and show data in graphs [9]. In addition, the projects provide students with the opportunity to learn by living with the ability to conduct scientific research [10]. Through project practice, students experience a realistic learning environment and apply theory to solve practical problems, thus gaining professional knowledge closely related to thinking, action, and context [11]. Projects allow students to collaborate and seek answers to guiding questions, increase their perception of their talent by using digital applications, and enable them to produce concrete products as project outputs [12]. In this respect, it can be said that project studies contribute to individuals in many different ways. Individuals trained by teachers continue to live as members of society.

The structure and dynamics of the 21st century society differ from previous generations. Teachers should raise individuals who adapt to this change and should be able to ensure the development of students. Teacher education should provide teachers with opportunities to develop their 21st century skills and the abilities to carry these skills into their future classrooms [13]. In the 21st century, not only academic skills are needed, but also skills such as digital literacy, creative thinking, effective communication and productivity needed in an increasingly complex society [14]. In this context, undergraduate students develop themselves in many ways by being involved in a scientific research process through project works. It can be said that project works will contribute to pre-service teachers in terms of gaining many skills such as critical thinking, problem solving, reasoning, analysis, interpretation, information synthesis, creativity and research skills, which are among the 21st century teacher skills. For this reason, it is an important for pre-service teachers to experience a project preparation, planning and execution process while receiving undergraduate education.

The Scientific and Technological Research Council of Turkey (TUBITAK) is an organization that supports scientific research, activity and project works with the purpose of promoting, directing and popularizing science and technology in Turkey. This important organization, which was established to support and encourage scientific and technological research and development projects, was established on 24-07-1963 [15]. There are different support programs for undergraduate students in terms of scholarship and project work.

One of these supports, TUBITAK 2209-A University Students Domestic Research Projects Support tries to encourage undergraduate students to conduct research by means of projects. With this project support, students prepare a scientific project for a problem they are curious about in a field of study they are interested in, and thus gain many academic skills. In this connection, it is thought that it is important to create awareness of undergraduate students about the relevant support program and to carry out studies that will enable them to have knowledge and experience on how to prepare a project. It is especially considered to be important that students studying at education faculties should learn how to prepare projects so that they can gain this culture and provide the appropriate guidance to their prospective students for them to prepare projects. In the study conducted by Metin Peten *et al.* it was aimed to improve the skills of pre-service science teachers in writing/preparing and applying projects for TUBITAK Support Programs [16].

Before the project preparation training application developed within the scope of the research, the projects suggested by the pre-service teachers were examined and they reached the conclusion that the pre-service teachers did not know what research, research-development and knowledge research project types meant, the project type was chosen and determined incorrectly, and the project purpose was not expressed in clear sentences. In order for pre-service teachers to manage the project process they will have their students make in the future correctly, they must first be competent about project construction and management processes [17]. In this context, a project writing training was developed and implemented for pre-service primary teachers in the current study. The purpose of the study was to investigate the effectiveness of the project writing training developed and implemented for pre-service primary teachers.

2. RESEARCH METHOD
2.1. Research model
A case study was adopted in the research. It is stated that the case study is a qualitative approach in which one or a few situations limited in a certain period of time are examined in depth with data collection tools such as observations, interviews and documents, and the themes related to this situation are defined

[18]. In this context, an online project writing training was organized for pre-service primary teachers in the research, and in this process, they were provided with theoretical and practical knowledge and skills on this subject.

2.2. Study group

The participants of the current study were 17 students of the department of primary school teaching at nine different universities in Turkey. Criterion sampling, one of the purposive sampling methods, was used to determine the participants. It is stated by Büyüköztürk *et al*. that the participants of the criterion sampling method consist of people, objects or situations having the desired characteristics related to the research problem being studied [19]. In this respect, the criterion of being studying in the department of primary school teaching of education faculties was taken into account in the determination of the participants. The applications received through the project web page were evaluated and it was determined that 21 participants met the criteria. However, for various reasons, some participants could not attend the training and a total of 17 pre-service teachers took part in the study group. The universities where the pre-service teachers in the research study group studied are shown in Figure 1. The figure shows that the research participants came from nine different universities.
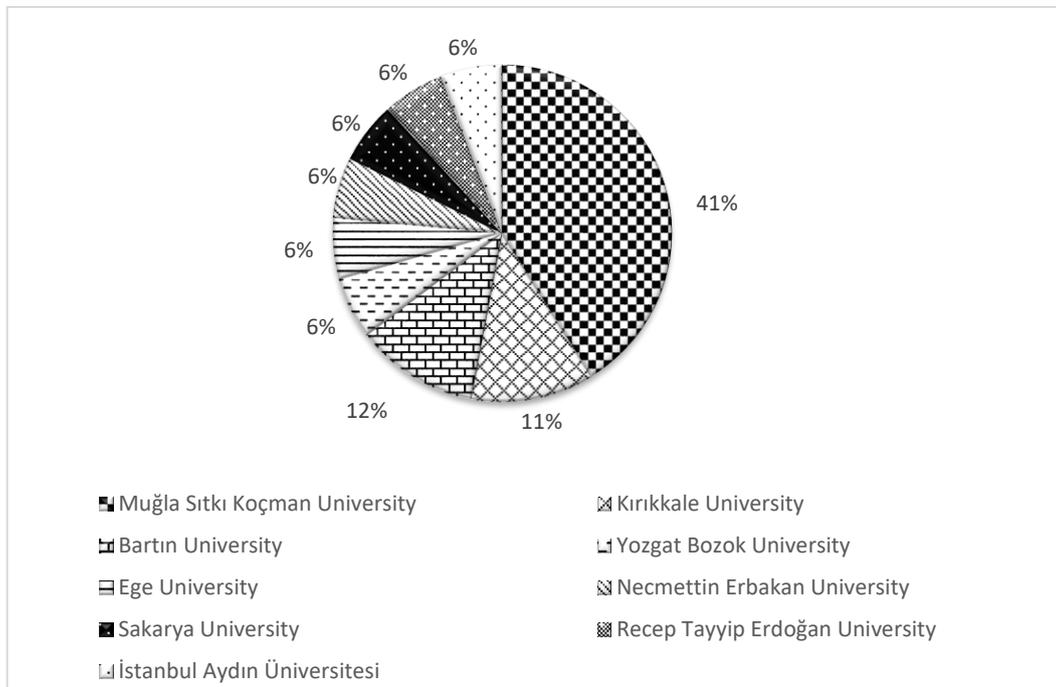
Figure 1. Universities where the participants studied

2.3. Research process

Within the context of the current study, a project writing training was planned for pre-service primary teachers. In this context, TÜBİTAK 2209-A University Students Research Projects Support Program was taken as reference and it was decided to provide training for this type of project that pre-service teachers can carry out during their undergraduate education. Then, academic studies and projects for undergraduate students on the issues of project development, project preparation and project management were examined. At the same time, an activity plan was determined by taking into account the scope of the project preparation in education course, which is one of the pedagogical content knowledge courses in education faculties. Expert opinion was obtained from two experts in the field of curriculum and instruction and primary education regarding the determined training plan. The subjects in the training plan were revised according to expert opinions. Later, field experts who could provide this training were determined and lesson plans were prepared by the trainers. The activity program developed within the scope of the research is given in Table 1.

Table 1. Project writing training activity program

Hour	1st day	2st day	3st day	4st day	5st day
09:00-09:45	Opening and introduction of training	Problem state in scientific research	Online game and event workshop	Preparation of project proposal form	Presentation of project proposals
10:00-10:45	Meet event	Literature search	Project management	Preparation of project proposal form	Presentation of project proposals
11:00-11:45	The nature of scientific research	What is a project?	Project management	Preparation of project proposal form	Presentation of project proposals
12:00-12:45	Scientific research ethics	I have an idea	2209 a project application	Preparation of project proposal form	Presentation of project proposals
14:00-14:45	Creative thinking workshop I	Scientific research methods and design	Presentation and poster preparation	Preparation of project proposal form	Planning the project
15:00-15:45	Creative thinking workshop II	Scientific research methods and design	Presentation and poster preparation	Preparation of project proposal form	Planning the project
16:00-16:45	Research trends in classroom education	Scientific research methods and design	Reporting of research results	Preparation of project presentations	Evaluation of the project
17:00-17:45	Research trends in classroom education	Scientific research methods and design	Reporting of research results	Designing the project poster	Evaluation of the project

When Table 1 is examined, the content of the activity program developed within the scope of the research is seen. The activity program was implemented online for five days, eight sessions every day. The program includes both theoretical and practical lessons. Within the scope of the activity program, there was a total of 112 hours of lessons, of which 28 hours were theoretical and 84 hours were practical. In addition, it was aimed to develop the thinking skills of the participants and to get them to reflect these ways of thinking to the project proposals with the workshops. In the activity program, the content that the pre-service teachers would need for project development was presented in the first three days interactively by the field experts. During the process, the project ideas of the participants were developed. On the fourth day, they developed these ideas under the guidance of academic advisors and carried out the works of preparing a project proposal form, preparing a presentation and preparing a poster regarding their ideas. These works were also carried out online, but all the groups and advisors worked in separate online rooms. On the last day, all the participants made their project proposal presentations one by one and their projects were evaluated by the field experts who were also the trainers. In this process, trainings and academic consultancy were carried out by nine different academicians. The distribution of trainers according to their titles and fields is shown in Figure 2.
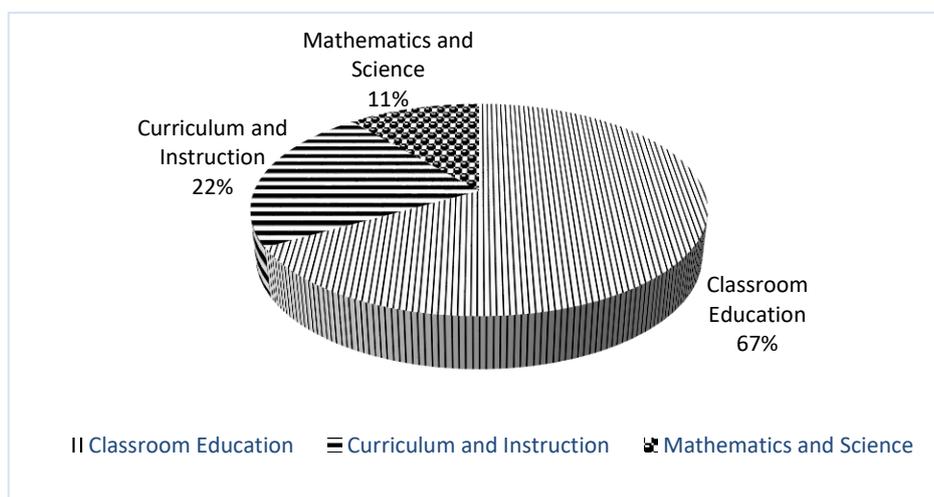
Figure 2. Titles and fields of trainers

As seen in Figure 2, project writing training was given by experts in the field of Classroom Education, Curriculum and Instruction, and Mathematics and Science Education. There were six of the academicians who gave the training were Prof. Dr., two of them Assoc. Dr. and one of them Dr. has the title. In the evaluation of the effectiveness of the program implemented within the scope of the research, success criteria and participant opinions were taken as basis. In this context, the success criterion, which is the first method, was determined as the complete completion of a project proposal form by the participants at the end

of the training. There were 17 pre-service teachers who participated in the training completed a project proposal form and these project proposals evaluated by academic advisors at the end of the training. The subjects of the developed project proposals are various topics such as: i) Children's games related to the field of classroom education, ii) Classroom management during the pandemic process; iii) Artistic competencies; iv) Digital stories; v) Activity-based applications; vii) Peer interaction; viii) Creative drama; ix) Values education; x) Reading skills; xi) Mathematics teaching; xii) Philosophy with children; and xiii) Reading on the screen has been determined. In this context, the experts in the project stated that the success criterion was met. The project proposals developed by the participant teacher candidates were directed to apply to the TUBITAK 2209-A support program. Participant opinions, which is the second method in evaluating the effectiveness of the project training, are presented in the findings section by analyzing the data.

2.4. Data collection tools

In order to obtain the research data, interviews were conducted with the participant classroom teacher candidates. An interview form was prepared by the researchers to be used in the interviews. For the prepared interview form, first of all, the literature was scanned and draft questions were prepared. Expert opinions were taken for the draft form and necessary arrangements were made and the form was given its final form. The form included four open-ended questions for the participants to evaluate the process. The interview form was applied to the participants online through the Socrative application. Answering the interview form took an average of 50 minutes.

2.5. Data analysis

Descriptive and content analysis was carried out for the data obtained within the scope of the research. In this context, first of all, the responses to the form were classified. Later, the coding processes were carried out independently by the researchers. The percentage of agreement was calculated for the codings and a consensus was reached between the researchers. Afterwards, the themes and sub-themes were created and the findings obtained from the analysis of the data were revealed.

3.   RESULTS AND DISCUSSION

According to the data obtained from the interview form, it was determined that the participating pre-service primary teachers expressed various opinions about the project writing activity developed and implemented. These opinions were gathered under three themes: i) Planning of the training; ii) Its contribution to the participants; and iii) The shortcomings of the training. Information on the themes and sub-themes obtained is presented in Figure 3.

Figure 3. Theme and sub-themes

When Figure 3 is examined, it is seen that the theme of planning training of four sub-themes: content, program, process and trainers. It was determined that the theme of contributions to the participants consisted of three sub-themes: cognitive, affective and social. It is seen that the theme of shortcomings consists of the sub-themes of lack of time, timing and face-to-face education.

3.1. Planning of the training

Within the context of the project planning theme, the participants expressed their opinions about the content, program, implementation process and trainers of the training developed and implemented. In this context, the participants stated that the content of the training is rich, suitable for the purpose of writing a project, can contribute to the closure of knowledge gaps, is versatile and qualified and combines theory and practice. The following are statements from some of the trainees:

"The content of the project I participated in consisted of exactly what we needed. There was no missing or excess content. A rich content was prepared that included the information we needed to have about writing a project" (K2)

"The project content was prepared with a high instructive quality. Each lesson in the project had a meaning and a reason and I left each lesson with additional knowledge" (K9)

"Our project was a multi-faceted project in which we received plenty of theoretical information, as well as practical, and spent fun times in different workshops" (K5)

The participants stated positive and negative opinions about the program of the training. As positive opinions, the participants stated that the lessons and lesson times in the activity program were sufficient, the planning and the breaks between the activities were appropriate, and they stated that the activity program served the purpose. The following are the statements of the participants:

"We were introduced to project writing processes through trainings and presentations. We were informed about many subjects such as the method of the project, data collection tools and data analysis included in the activity program. In this sense, I think the training program was very adequate and appropriate" (K1)

"I thought that I could not improve myself during the pandemic, and then I came across such a magnificent project. I can say that the planning of the project, the lesson times were very sufficient and moved us away from the negative effects of the pandemic" (K13)

"Providing us with the opportunity to practice on the 4th day of the project, I think, was the most crucial part. We experienced learning by doing and living in the best way and received constructive feedback. We easily saw our mistakes" (K8)

"The fact that the project was long, that is, from morning to evening, was a bit tiring even if there were breaks. I felt a little tired in front of the computer; all the other things were very good" (K10)

It was determined that the participants expressed generally positive opinions about the implementation process. The participants stated that the implementation process was efficient, instructive, beneficial and productive. In this context, Here are some statements from the participants:

"I can say that the project implementation process was conducted with maximum efficiency. We had a very good experience in this process" (K3)

"Although I did not have any knowledge on writing a project before, I now feel more equipped and familiar with the field. In this sense, I think this process was very instructive and beneficial for us" (K11)

"At the beginning of the training, I never had a TÜBİTAK project idea, but during this process I had an idea and I had the opportunity to ask questions that occurred in my mind" (K16)

It was determined that the participants expressed generally positive opinions about the trainers. The participants, who expressed their opinions about the trainers under this theme, stated that the trainers who taught them theoretically and practically are experts in their fields, experienced, understanding, self-sacrificing, motivating and patient. Here are some statements from the participants:

"The trainers were successful people in their field and answered the questions posed enthusiastically. During this process, I could easily reach my trainers for the issues I was curious about or the problems I encountered while creating my project draft" (K1)

"Our trainers motivated us to reach the best and richest content, keeping us standing like the skeleton of a building with their high energy. All of them were valuable and expert in their fields" (K5)

"I took it as a course at my university before, but it is very important to have different professors and to benefit from their experiences. In addition, they answered all our questions very patiently during this process" (K13)

The participants generally expressed positive opinions about the content of the training, the program, the implementation process and the characteristics of the trainers within the scope of planning of the training. Project work is a process that requires the systematic use of scientific research skills. In this context, students seek solutions to problems by questioning, holding discussions, making predictions, designing plans, collecting and analyzing data, making inferences, presenting their ideas and findings to others and presenting products [9]. In this regard, it is important to include the information that the participants need, such as information about the project and scientific research processes in the content of a training on writing a project.

Correspondingly, it is thought that it is important that the content prepared within the context of the study includes the information that will be needed on this subject in general. It can be said that the content of the training developed within the context of the study can be used as an example in the courses to be given on project preparation or in similar trainings. It is also of great importance that the content of the training program is organized and designed according to the most appropriate approach. It can be said that the linear content arrangement approach is preferred in the program prepared for the developed training. In this approach, it is stated that there are sequential, related, consecutive, prerequisite learning units [20]. In this context, it is thought that the content that the participants should have for the project writing process was planned in a way that would facilitate their learning and satisfaction was ensured in this regard. Project works represent an open-ended learning environment with activities involving teacher-student and student-student interactions [21]. In this regard, it is important to prepare a process in which participants can feel and experience this environment in the training given on project preparation. One of the biggest factors here is the characteristics of the people who give the training.

However, it is stated that there are difficulties in project preparation processes such as managing time and materials, working independently and working with others [22]. However, at this point, it is possible to get rid of both the prejudices and to solve the problems related to the project management process with the right mentoring. In fact, within the context of the current study, the participants stated that the trainers' experience, correct guidance and positive attitudes contributed to the development of their self-confidence as well as provided meaningful learning.

3.2. Contributions to the participants

The participants stated that the project training made cognitive, emotional and social contributions to them. The participants stated that they gained in-depth information about the types of project, the concept of project, the project development process, the use of scientific language, data collection, the review of resources, academic writing, the development of a project idea and the preparation of a project poster and presentation in the cognitive contribution dimension of this training. Here are some statements from the participants:

"Through the project I participated in, I gained knowledge and skills about what kind of projects there are at Tübitak, which university students can participate in, how to search resources, how to prepare a project draft, how to limit the project idea, how to choose a project method and many more" (K12)

"I saw the current problems in life and the problems that I may encounter in my professional life from a broader perspective. When I asked myself what I could do to solve these problems, my suggestions became my sub-problems such as the applicability of these ideas. But with the lessons we took in the process, I learned how to deal with these problems and through which stages projects that we can develop for problem solving should go" (K5)

It was determined that the participants thought that the training provided positively contributed to them affective. The participants stated that the training carried out made affective contributions to them such as increasing self-confidence, awareness and willingness. Here are some statements from the participants:

"It was a stepping stone for me to be academically successful. It increased my self-confidence and improved my belief that I can achieve something" (K16)

"I started to feel more confident in project writing. Although I am currently writing a project, this is a project that I have attempted to write individually. I actually climbed the stairs with this training to reach the top. My confidence in writing more realistic and grounded projects has increased" (K8)

It was determined that the participants thought that the training provided positively contributed to them social.The participants stated that the training had some social contributions such as better communication, peer relations, cooperation and interaction. Here are some statements from the participants:

"I have met new people; we helped each other by communicating with each other through social networks such as WhatsApp and Instagram. It contributed to the development of my communication skills" (K1)

"At the same time, the communication between us and with pre-service teachers from different universities who participated in the project benefited us socially" (K9)

One of the important findings obtained within the context of the current study is the contributions of this training to the participants. Based on their own experiences, the participants stated that they achieved significant cognitive, affective and social outcomes. As a result of the study conducted by Bourner *et al.* it was revealed that the students stated that their skills of working with different people, doing research, conducting data analysis, planning and organizing a study, using time effectively, making verbal and written presentations and problem solving improved through group and project works [23]. The project development process has positive effects on the knowledge [24] and skills of pre-service teachers [25], [26]. In this respect, it is thought that it is important to provide them with such an experience before starting their professional life. At the same time, it is stated that the project development process also affects the construction of the personal and professional identities of the participants, that this process teaches cooperation and acceptance of the other and encourages the establishment of friendly relations [27]. Participants can obtain positive affective, social and cognitive outcomes with the qualified processes they are involved in while developing a project. This, in turn, contributes to the development of positive attitudes towards project work and the development of collective working awareness.

3.3. Short comings

Some of the participants stated that there were shortcomings such as insufficient time, timing and face-to-face training for the project training developed and implemented. Regarding the inadequacy of time, some participants thought that this training should be more than five days. In this regard, one participant expressed his/her opinions:

"I think the time set for the project is insufficient. Although the goals of the project were achieved, we worked really hard. Although I think that five days were enough for the training, it would be nice if the participants were given a few more days to develop a project and come up with a product" (K3)

In terms of timing, some participants stated that it was tiring for them to have all day classes in the activity program and that the program should be planned to be spread over two weeks. This situation is one of the negative situations stated for the training carried out. There was one participant stated that too many lessons in a day tired them a lot:

"In general there are only time-related problems. In general, since all TÜBİTAK projects are carried out in a short time, the time allocated to the project can be very long during the day. This causes us to get tired after a while. I would prefer this training to spread over two weeks" (K10)

Some of the participants expressed a negative opinion about the online training and emphasized that face-to-face training could be more productive. Some participants think that this training will be more effective if it is face-to-face. There was one of the participants expressed his/her opinions about the delivery of this training face-to-face:

"In my opinion, what was missing in the project was the creation of a face-to-face training environment by project participants, project managers and trainers" (K16)

Within the context of the study, it was determined that there are some situations that the participants described as the shortcomings in the training developed and implemented. In this context, the participants

stated that the training period could be longer, spread over a wider period of time, and that the training could be conducted face-to-face. The main problems encountered in the study conducted by Fındık Coşkunçay and Bingöl to determine the problems experienced during the mentor-supported one-to-one R&D project writing training process were generally identified as the original value, work areas, awareness of responsibility, training duration, project team, participation in training and mentoring. the appointment process [28]. In the project development process, the participants should have knowledge not only about the project, project types and project management, but also about the scientific research process and the methods used in the related process.

Therefore, the lack of preliminary information on these subjects causes a project writing training to be insufficient for them in terms of time. A course giving information about scientific research methods is offered in the department of primary school teaching. However, two class hours allocated to this course a week are thought to be not sufficient for both content and practice [29]. It can be said that the reason for the insufficient time of the training for the participants is due to the inadequacy of their scientific research skills. In addition, some of the participants thought that it would be more efficient to give this training face-to-face. Giving face-to-face training on project writing processes will definitely have positive effects. It is thought that the collective awareness required by the project works and the outputs to be obtained will be more when more face-to-face interaction is provided.

4. CONCLUSION

As a result, in the current study, a project writing training was developed and implemented for pre-service primary teachers. The training was evaluated on the basis of the opinions of the participants and it was determined that the participants' opinions on this training were generally positive. Given the positive effects of project work on students, it is considered important to develop the competence of writing projects in pre-service teachers through both courses and these trainings. In order to train individuals equipped with 21st century skills and to be role models for them, pre-service teachers should be provided with meaningful experiences on this subject by using the results of such studies.

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