Opinions of Teachers on "This Is My Work" Project Competition

Article · September 2015

CITATIONS
0

READS
178

4 authors, including:

Fatih Ozkan
Baylor University
3 PUBLICATIONS **1** CITATION
SEE PROFILE

Fulya öner armağan
Erciyes Üniversitesi
50 PUBLICATIONS **150** CITATIONS
SEE PROFILE

Aslı Saylan Kırmızıgül
Erciyes Üniversitesi
52 PUBLICATIONS **98** CITATIONS
SEE PROFILE

Tarih Okulu Dergisi (TOD)
Eylül 2015
Yıl 8, Sayı XXIII, ss. 211-243.

Journal of History School (JOHS)
September 2015
Year 8, Issue XXIII, pp. 211-243.

DOI No: http://dx.doi.org/10.14225/Joh753

OPINIONS OF TEACHERS ON "THIS IS MY WORK" PROJECT COMPETITION

Fatih ÖZKAN[*]
Fulya ÖNER ARMAĞAN[**]
Oktay BEKTAŞ[***]
Aslı SAYLAN[****]

Abstract

This study investigated the opinions of teachers participated in 'This Is My Work' project competition on the applicability of the competition, the difficulties they faced and its contributions to science education. In this study, phenomenology which is one of the qualitative research methods was employed. Data was collected with four science teachers in 2014-2015 academic year in Kayseri. Semi-structured interview was used as a data collection tool. Interview form was formed and was controlled by three science education experts. Data analysis was conducted through descriptive analysis. Based on findings, the participants encountered difficulties in respect to time, cost and place during project preparation process. In conclusion, the project competition positively affected the students' achievement. Nonetheless, the participants stated that project assessments should be fair, project preparation period should last longer, and should reach the large masses. As a suggestion, it is believed that clearly notifying students and teachers of project assessment project and selecting the assessment jury among stakeholders (teachers, students, managers, parents, etc.) is important.

Keywords: *"This Is My Work" project competition; science education; project based learning*

[*] Fen Bilgisi Öğretmeni, Kayseri.
[**] Yrd. Doç. Dr., Erciyes Üniversitesi Eğitim Fakültesi Fen Bilgisi Öğretmenliği Bölümü.
[***] Yrd. Doç. Dr., Erciyes Üniversitesi Eğitim Fakültesi Fen Bilgisi Öğretmenliği Bölümü.
[****] Arş.Gör., Erciyes Üniversitesi Eğitim Fakültesi Fen Bilgisi Öğretmenliği Bölümü.

“Bu benim eserim” proje yarışması hakkındaki öğretmen görüşleri

Özet

Bu çalışmada, “Bu Benim Eserim” proje yarışmasına katılan fen bilimleri öğretmenlerinin proje yarışmasının uygulanabilirliği, proje uygulaması esnasında karşılaştıkları güçlükler ve bu yarışmanın fen eğitimlerine katkıları açısından görüşlerinin alınması amaçlanmıştır. Nitel araştırma yaklaşımının kullanıldığı bu çalışmada olgu bilim (fenomenoloji) araştırma deseni kullanılmıştır. Araştırmanın verileri 2014-2015 eğitim öğretim yılı güz döneminde Kayseri ili, Bünyan ilçesinde farklı okullarda çalışan dört fen bilimleri öğretmeninin görüşleri alınarak toplanmıştır. Veri toplama aracı olarak yarı yapılandırılmış görüşme kullanılmıştır. Bu amaçla, görüşme formu oluşturulmuş ve bu form oluşturulurken fen eğitiminde uzman üç kişinin kontrolleri ile forma son hali verilmiştir. Verilerin analizi nitel araştırma analiz yöntemlerinden olan betimsel analiz yoluyla yapılmıştır. Elde edilen bulgulara göre katılımcıların, proje oluşturma süresinde zaman, maliyet ve mekân sıkıntısı yönünden güçlükler yaşadıkları görülmüştür. Proje yarışmasının öğrencilerin başarı ve tutumlarında olumlu yönde değişiklik olduğu sonucuna ulaşılmıştır. Bununla birlikte proje yarışması hakkında proje değerlendirmelerin adil olması, proje hazırlama sürecinin daha uzun olması ve geniş kitlelere ulaşması katılımcılar tarafından belirtilen görüş, istek ve önerilerdir. Alan yazın çalışmaları ile elde edilen bulgular, benzerlik ve farklılık açısından tartışılmış ve adil bir değerlendirme sürecinin olması gibi önerilerde bulunulmuştur.

Anahtar Kelimeler: *Bu Benim Eserim Proje Yarışması, Fen Eğitimi, Proje Tabanlı Öğrenme*

Introduction

The new science curriculum adopts constructivist approach in Turkey. This approach allows learning by living and enables students to actively participate in learning process (Blumenfeld, Soloway, Marx, Krajcik, Guzdial & Palincsar, 1991; Korkmaz & Kaptan, 2002; Matthews, 1993; Wilson, 1997). According to constructivist approach, learning is an individual’s process of analyzing and constructing information and this process is guided by thoughts, experiences, observations and interpretations already present in one’s mind (Duit, 1996; Krajcik, Blumenfeld, Marx & Soloway, 1994). Constructivist approach assumes more responsibility to individuals during learning process in

which they actively participate (Bell, 2010; Helle, Tynjala & Olkınuora, 2006). Furthermore, students have a chance to construct their new information by using their prior knowledge. A student who has adopted constructivist philosophy realizes meaningful learning rather than memorization (Duit, 1996; Matthews, 1993). New information is rendered meaningfully since students combine with prior knowledge and experience with the new situation (Daley, 2001). In a similar fashion, learning is based on transferring prior knowledge, reinterpreting information and establishing a link between prior learning and new information rather than memorization according to this approach (Abbott & Ryan, 1999). Learners solve the problems in daily life by constructing and establishing coherence between prior and new information (Brooks & Brooks, 1999; Perkins, 1999). As a conclusion, the new science curriculum aims for developing individuals that research, question, associate daily life with science subjects (Lee & Tsai, 2004), use scientific research methods in problem-solving (Mills & Treagust, 2003) and look from the perspective of a scientist (MEB, 2005; TTKB, 2005). In line with these objectives, various actions have been taken in Turkey for raising individuals with the aforementioned characteristics. One of these actions is based on project preparation. Project is a study that is based on information gathering through observation within a given period, includes arrangement of obtained information, reveals cause and effect relationship therein, and leads to various products as a result of its implementation. (MEB, 2014; TÜBİTAK, 2010). According to Kubinova, Novotna and Littler (1998), project is comprised of the individual or group studies conducted authentically by students for the solution of a problem. Also according to Kubinova et al. (1998), the main characteristic of a project is that it introduces decision-making skill to students on how and in what order they would solve a problem.

Turkish Ministry of National Education (MEB) organizes a project competition entitled ‘This Is My Work’ for secondary schools on an annual basis for encouraging teachers to carry out project work. The competition, which has been held by MEB and TUBITAK (Turkish Scientific and Technological Research Council) collaboration as of 2005-2006 academic years, aims for introducing the aforementioned characteristics of constructivist approach to teachers and students. This competition also targets to enable students to think, establish them cause and effect relationship, improve their skills and attain a researcher’s spirit (MEB, 2014). Furthermore, various

rewards are given to top-ranked students and teachers in order to encourage participation. Each project is assessed in the province of application by students and teachers within this Turkey-wide competition. Later on, qualifying projects in each province are assessed within predetermined regions. Projects selected in regions are exhibited within a single center.

Project competitions encourage science teachers as much as bringing along certain problems. It has been determined in the literature that teachers have certain concerns and distresses in project development process. For instance, allocating time to projects and reviewing groups' projects are among the problems encountered from the perspective of teachers. Furthermore, projects uncompleted by students by deadlines and noncompliance by students with the project schedule are among the distresses (Cook, 2003; Gültekin, 2007; Kankelborg, 2005; Korkmaz & Kaptan, 2002; Tortop, 2013; Uzal, Erdem & Ersoy, 2012). Science teachers who have participated in the survey conducted by Tortop (2013) are of the opinion that 'This Is My Work' project competition does not make any contribution to the participating teachers and students at all due to reasons such as, pressure exerted by school directors, financial shortcomings in project development process, lack of time and place, partial assessment by project jury and organizational problems. Moreover, Tortop (2013) has pointed out the requirement to identify the ongoing problems in project competitions within developed countries and to bring forward the opinions of teachers, students and administrators in respect to enhancing efficiency. Similarly, Demirhan and Demirel (2003) suggested that problems can be faced in project works unless laboratories are available at schools of the teachers. Cook (2003) determined that some teachers define project process as merely informing students on the latest participation date and receiving the projects that were prepared and delivered by students. Kankelborg (2005) detected that teachers living in rural areas and experiencing problems in project participation are jealous of specialized teachers. Çelik (2003) stated that other problems faced by teachers during project development process include lack of place, laboratory, tools and equipment. The researcher also expressed that lack of tools and equipment can pose an issue even with an accessible laboratory environment and that it could lead to insufficient time to implement a project. Tutak, Kaya, Kükey and Gün (2012) determined in the survey, in which they received the opinions of mathematics teachers who have participated in 'This Is My Work' project competition, that awards given by project competitions were

inadequate which discouraged students to participate in projects and teachers had difficulty in motivating students during project development process. A teacher who participated in the survey conducted by Tutal et al. (2012) expressed that students should be given awards which could motivate them.

Gültekin (2007) stated that studies can remain inconclusive so long as project teachers do not inform their students on the actual objective of project work. Furthermore, he stated that teachers could face problems such as noise made by students during project development process, restricted time, inadequate importance attached to experiments by students, lack of tools and equipment, inaccessibility of information by students and communication problems among group members.

Korkmaz and Kaptan (2002) mentioned that students can need extra time in places such as home and library and such extra time can be inefficient and boring for students. Bacanak, Bolat, Değirmenci and Kaşıkçı (2014) obtained the finding that financial problems arise in project competitions. Güven (2013) determined in his study conducted with science and technology teacher candidates that teacher candidates have difficulty in terms of developing projects and allocating sufficient time.

Öztuna-Kaplan and Diker-Coşkun (2012) conducted an action research on difficulties faced in project based learning practices and solution suggestions. This study revealed the findings that problems arise in respect to time and place during project development process and opinions of students are not received for determining project topics. Civelekoğlu and Öztürk (2010) concluded that teachers do not consult to students while determining project topics.

Asking the opinions of teachers on ‘This Is My Work’ project competition would enhance the quality of education. Project works have objectives such as improving quality in science education and turn students into the individuals who research and question. It is obvious that teachers have certain concerns during project development. The opinions of teachers, who assume the role of project advisor, are important in order to eliminate these concerns and achieve goals. However, as it can be seen from the aforementioned literature, phenomenology studies which receive the opinions of science teachers on ‘This Is My Work’ project competition are restricted in number. Therefore, this study should be conducted with the aim of determining teachers’ opinions on ‘This Is My Work’ project competition.

Research question and sub-problems

What are the opinions of science teachers on 'This Is My Work' project competition?

Sub-problems;

- ✓ What are the opinions of science teachers on the applicability of 'This Is My Work' project competition?
- ✓ Which difficulties do science teachers encounter concerning 'This Is My Work' project competition?
- ✓ What are the opinions of science teachers on the contributions of 'This Is My Work' project competition to science education?

Method

Research design

Phenomenology, which is a qualitative research pattern, has been used in this study as it gives the opportunity for in-depth review and interpretation of participants' opinions. Phenomenology is a qualitative research design that aims for revealing the experience and perception of individuals in relation to a phenomenon and the meaning attributed to these by them (Yıldırım & Şimşek, 2013).

Sample

Four science teachers employed at different schools in Kayseri province, Bünyan district in 2014-2015 academic year participated in this study. In qualitative research, it is important to have small groups of samples in order to investigate sample in depth and in detail (Creswell, 2009; Miles & Huberman, 1994). Therefore, criterion sampling, one of the purposeful sampling methods, was selected to ensure that the research is suitable for its purpose. The basic understanding in criterion sampling method is to study with the individuals who meet a set of predetermined criteria (Yıldırım & Şimşek, 2013). Therefore, interviews were completed with four teachers who previously participated in 'This Is My Work' project competition, for the purpose of research.

The purpose of the research and how the interview would be conducted were explained to the participants and their verbal consent was received. The names of the participants were not used in framework of research ethics.

Therefore, participating teachers were assigned as the codes of K1, K2, K3 and K4. The characteristics of participants are given in Table 1.

Table 1. The characteristics of participants in terms of gender, age and professional time.

Participant	Professional experience	Project experience	Gender
K1	4	2	Male
K2	5	1	Male
K3	6	3	Male
K4	7	3	Male

Data collection tools

Semi-structured interview was used as data collection tool in the study. This method allows researcher to ask a question again if the response is incomplete or ambiguous and allows the participant to give response (Merriam, 2009; Patton, 2002).

Literature review was used while developing the interview form (Tortop, 2013; Tutak et al., 2012). Two science educators and two science teachers were consulted in respect to the format and contents of the interview form.

The interview form, which was revised in accordance with these opinions, was finalized subsequent its review by a science educator. The final version of interview form consists of two sections and 19 questions. The first section consists of four questions regarding the demographic information of participants and the second section consists of 15 questions regarding the perspective of teachers towards 'This Is My Work' project competition.

Interviews were conducted during two weeks in 2014-2014 academic years, fall semester. The interviews, which were made individually with each participant by one of the researchers, lasted for an average of 25 minutes. The interviews with the participants were made in a comfortable and silent environment. A voice recorder was used with prior consent of participants. Note taking method was employed to confirm the thoughts of participants during the interview. Voice records were transcribed in verbatim by one of the researchers, transcriptions were transferred to the electronic interview form and the accuracy of texts was verified by listening the voice records again. Later on, the texts were handed to participants for verification of accuracy and completeness of records as well as internal validation of data.

Data analysis

Descriptive analysis was used for the analysis of data obtained from the interviews. Descriptive analysis aims for presenting data to readers through description subsequent to their arrangement (Marshall & Rossman, 2006; Yıldırım & Şimşek, 2013). The texts obtained from the interviews were read by researchers and raw data obtained for each question were converted into codes. 15 themes were created in the light of the codes. The codes and themes that were developed were reviewed by a science teacher, and revisions were completed accordingly. Later on, the codes and themes were reviewed and finalized by two science education specialists to increase internal reliability. For instance, to form the theme of "project participation", firstly, the responses of participants were read by three of researchers and then codes and themes were determined by reaching an agreement. The themes that were developed are given in Table 2.

Table 2. Developed Themes

Theme	
1. Project participation	1. Student participation
2. Factors that determine project topic	2. Selection criteria
3. Difficulties faced	3. Contributions to student
4. Contributions of seminar	4. Tasks of teacher
5. Competency in science and pedagogical content knowledge	5. Project award
6. Project areas	6. Project assessment process
7. Project based teaching	7. Opinions, suggestions and requests

Validity and reliability

Internal Validity

In order to improve the internal validity (plausibility) of the study, conversations were made with each participant for comforting purposes prior to interview and they were engaged in long-term interactions through interviews that lasted for 20 to 30 minutes. Furthermore, participants were made to confirm the transcriptions of voice records by reading. As interview was the only data collection tool of the survey, data triangulation is limited. The interview form was submitted to the opinions of two science teachers and two specialized

science educators in respect to confirmation of its suitability to its purpose with an attempt to enhance internal validity. Furthermore, participants were directly cited in the findings chapter without revealing their identities.

External Validity

Criterion sampling as one of the methods of purposeful sampling was used and as it was also stated the opinions of teachers in a detailed manner in order to enhance the external validity (transferability) of the study. Furthermore, detailed description was used by explaining phenomenology design, semi-structured interview, data analysis (codes and themes) and findings in an attempt to improve external validity.

Internal Reliability

Findings were presented to the readers without any interpretation to enhance internal reliability (consistency) of the study. Furthermore, the codes and themes were reviewed by a science teacher and two science educators, and revisions were executed accordingly.

External Reliability

A science educator compared the results of the research with the data and reviewed these in respect to confirmability to enhance external reliability of the study.

Findings

Findings were presented below considering the themes. Titles of themes were given this presentation.

Project participation

Table 3. Codes concerning the question "How did you decide to participate in project competition?"

Codes	Participants
Informed by MEB	K1, K2, K3, K4
Encouraged by school management	K1, K2, K3, K4
Award	K3

All of the participants responded to the question 'How did you decide to participate in the project?' by stating that they decided upon the project promotion by district directorate of national education. K1, who has an experience of four years and previously participated in the competition with two projects, responded as *"Well, it is mostly encouraged by the administration, I mean Ministry of National Education, they encourage..."* K3, who has an experience of six years and previously participated in the competition with three

projects, stated as opposed to the others that awards also have an influence in project participation by saying that *"...at first, I was informed at the introductory meetings of This Is My Work Project held by Ministry of National Education. Then, they encouraged us to participate.* W*ell, the awards, both the extra awards of students here and again the awards to be given to us..."*

All participants expressed that they decided to participate in the project through the encouragement of school management as well. For instance, K2 said, *"The school administrations already want it so they recommended... For example it was optional for us to participate in the project. They made speeches to motivate us."* The codes of participants are given in Table 3.

Factors that determine project topic

Table 4. Codes concerning the question "Which factors were effective in determining the project topic for 'This Is My Work' project competition?"

Codes	Participants
Interest	K1, K4
Cost	K2
Relevant to daily life	K3

As it can be seen in Table 4, K1 stated that he determined the project topic by considering his own areas of interest. K1 explained that, *"Rather than the contribution of the students, we made studies about certain thoughts that we somehow took an interest in and wanted to focus on."* K4, on the other hand, stated that the areas of interest of their students were the basis rather than their own, with the words *"While we were determining the project topic, we found out the interest of students in model and posters by collaborative guidance."* K3 explained that they considered project topics in relation of daily life by saying, *"We attempted to select things that can be rather used in the daily life while determining the project topic. Things that can be used by children in everyday life, I mean, we tried to find solutions to make daily life easier..."* K2 expressed that the cost had a greater effect in determining the project topic by stating, *"Obviously cost had a greater effect...."*

Difficulties faced

Table 5. Codes concerning the question "Which difficulties did you face during project work?"

Codes	Participants

Compliance with the schedule /Applicability/Relevant daily life	K1
Laboratory	K1,K2,K3,K4
Time/Student selection/School management	K3
Cost	K1, K2, K3
Lack of materials	K4

K1 stated that they faced difficulties in respect to compliance with the science curriculum, applicability, relevancy to life, laboratory and cost during project work. For instance, K1 expressed their difficulties in respect to compliance with the curriculum, applicability and relevancy to life. Therefore, K1 stated that *"You cannot involve the students in projects to a great deal. Projects should be relevant to the life of children, so when you create the part of the curriculum that is relevant to life, you can establish its relationship with life in general. So the curriculum remains insufficient or if you obey to the curriculum, this time you cannot adapt the area which children can apply. This is the major problem."* Furthermore, all participants stated that unavailability or insufficiency of a laboratory at schools was among the difficulties faced during project work. K1 accordingly responded as, *"I mean, having a well-equipped laboratory would at least give better opportunities for us to realize what we had thought of, but the facilities are not good enough."*

K3 stated that they faced difficulties in respect to laboratory, time, student selection, school management, and cost during project development. For instance, in respect to student selection, K3 said, *"We had issues in project work in terms of student selection. While we gave information students about project, students did not want to participate in project as they thought it would be too difficult".* Furthermore, K3 also mentioned that they had trouble in project work in terms of school management by expressing *"...We had trouble in terms of the school, the school posed us difficulties regarding the additional lessons delivered within these projects..."* Moreover, K3 expressed their problems in terms of cost: "...*We had problems about financial resources. For instance, project required financial resources. We had difficulties in finding these..."* Finally, K3 explained the issues in respect to time by saying, "...*You have to spare time to this project within the day. We have to restrict ourselves with our life. As there was no time at school, we made our researches outside."*

K4, who has an experience of nine years and previously participated in the competition with three projects, explained that they had a difficult time in project work due to lack of materials by expressing *"During the project work,*

as I was advisor for rural students, we barely found the support to find materials". The codes of participants are given in Table 5.

Contributions of seminar

Table 6. Codes developed in relation to the question "Did the MEB seminar before participating in 'This Is My Work' contribute to your project development process? How?"

Codes	Participants
No/Guide	K1
Yes/Informing	K3
Yes/Sample project demonstration	K2, K3 and K4
Yes/Encouragement	K3, K4

As it can be seen in Table 6, K1 stated that the relevant seminar did not contribute to teachers at all while other participants stated that it was useful in respect to informing, setting an example and eliminating difficulty. K1 stated that the seminar did not make a contribution: *"…There is a guide book and you can look at it, they say... In fact they are not that useful. Well we have to read and understand the guide by ourselves anyway."* On the other hand, K3 stated that the seminar was useful for receiving information: *"In the project seminar delivered by National Education, trainee teachers had participated many more European Union projects, so they tried to explain us the objectives of this project."* Furthermore, K2, K3, and K4 stated that sample projects were demonstrated and this contributed in the project development process. K2 stated accordingly, *"They showed a few examples, they reflected on the presentation. They were helpful."* Additionally, K3 and K4 stated that the seminar encouraged them to develop project. K3 stated that: *"Seminar had a great contribution to us. We went there by expecting to find a new invention, but they showed us little things can also be projects and received awards. They explained us the award-winning projects of the previous years, so we said that we can succeed in project. We learned that this process is not very difficult at all and very simple things can receive awards. In fact, we were motivated."* K4 responded in terms of demonstration of model projects and encouragement, *"After we saw a few examples in the seminar I had the impression that this project was not too hard and my students could easily do it as well. If I hadn't seen it in the seminar, it would be very difficult thing for me."*

Competency in science and pedagogical content knowledge

Table 7. Participant codes concerning the question “Do you believe that your knowledge in science and pedagogics is sufficient for ‘This Is My Work’ project competition? If your answer is no, what do you do to overcome these deficiencies?”

Codes	Participants
Yes/Sufficient	K3
No/Communication	K1, K4
No/Internet	K2
No/In-service training	K4

Only K3 believed that they were sufficient in terms of science education and pedagogical content knowledge in the implementation of project competition. K3 expressed this situation as *“I believe that our pedagogical content training is adequate. Because my graduation does not date back too far. During our preparation, I believe that our pedagogical training sufficed well.”* K1 and K4 expressed that they did not believe that they were competent and mentioned that they contacted other science teachers to overcome this deficiency. K2 stated that he was insufficient in this field and filled this deficiency by searching in the internet: *“If I have deficiencies in this field, I mostly use internet. I try to overcome my deficiencies through internet.”* K4 stated that he improved his science and pedagogical content knowledge to contribute to his project development process through in-service training: *“I attended to in-service training seminars. For instance, I attended to a training seminar on experimentation. We had the opportunity to do all experiments one-to-one at school. It gave us practice.”* The codes of participants are seen in Table 7.

Project fields

Table 8. Participant codes concerning the question “From which fields do you participate in “This Is My Work” Project Competition? Why?”

Codes	Participants
Biology	K1, K3 and K4
Physics	K2, K3 and K4
Engineering	K2, K3

In response to the question ‘‘From which fields do you participate in ‘This Is My Work’ project competition?’’ K1 responded as Biology, K2 replied as Physics and Engineering, K3 answered as Biology, Physics and Engineering, while K4 responded as Biology and Physics. For the reason, K1 stated that he is keen on biology; K2 indicated that physics is applicable to the nature, K3 specified that physics, biology and engineering are relevant to life and K4 mentioned that he has a personal interest in scientific models. K1, who previously participated in the competition with two projects, associated his selection of biology field with his keen interest in this field, expressed: *“Our biology teacher at high school made me love biology. Therefore, I became interested in biology and here I continue in this field.”* K2 associated his selection of physics field with its applicability to the nature. He expressed that: *“Most projects are developed in the field of physics, obviously. Physics is more applicable to the nature itself. I mean engineering is covered by physics. Therefore physics is more applicable...”* K3 explained that the relevancy of physics, biology and engineering affected their selection of project topics: *“...physics is within our life just like simple machines, so it draws greater attention of children.”* K4 associated his preference of biology and physics with their personal interest in scientific models. Hence, he expressed that: *“... Children can make models of something in their bodies, for instance a digestion system model. We can already use biology much easier by building the models of all organs. When we use physics, we easily show the working principles of simple rules in physics.”* The codes of participants can be seen in Table 8.

Project based learning (PBL)

Table 9. Participant codes concerning the question “Do you follow the steps of PBL while preparing the project work in This Is My Work Project Competition? If your answer is no, which approach do you follow?”

Codes	Participants
Partially	K1
	K2
	K3
	K4

As it can be seen in Table 9, all participants stated that they partially follow the steps of PBL while preparing the project work. For example, K4 stated that he partially use PBL by expressing: *“Even if we maybe don’t apply*

project implementation steps on paper, we actually apply them when we follow the process. We are waiting for the discovery process from children. After child finds it, the child forms a model of it or makes a presentation of it. But we don't follow it in a fully planned way according to calendar but we see that the children follow that order."

Student participation

Table 10. Participant codes concerning the question "Do you actively include students in the process during This Is My Work project competition?"

Codes	Participants
Passive	K1
Active	K3, K4
No response	K2

As shown in Table 10, while K1 stated that he did not actively involve students in project preparation, K3 and K4 indicated that they actively involved students in this process. Regarding passive participation, K1 said, *"I see this is my work project competition as the teachers' competition. Students aren't much active... We are attempting to prepare a project so that we can bring along, not get ashamed of it with clever students I mean this is what we try to do. We rather guide them. Children cannot be actively involved".* On the other hand, regarding active participation, K3 expressed that: *"Yes, we actively involved students in the process... It was student-centered, teachers only guided students."* Furthermore, K4 said, *"I actively involved students. I explained the project to them, how the project will be prepared, and the stages of the project."*

Selection criteria

Table 11. Participant codes concerning the question "Which criteria do you apply while selecting students to This Is My Work project competition?"

Codes	Participants
Successful student	K1, K3
Generating ideas	K2, K4

While selecting students for the project competition, K1 and K3 considered student success criterion, while K2 and K4 selected students that could generate ideas for the project. Regarding successful student criterion, K3 said, *"We obviously pay attention to the successful students, because good*

projects are produced by successful students." K2 responded on the criterion of idea generation with the works, *"We select students who produce ideas about projects."* The codes of four participants are given in Table 11.

Contributions to students

Table 12. Participant codes concerning the question "What could be the contributions of This Is My Work project competition to the students?"

Codes	Participants
Associate to daily life	K1, K2, K3
Motivation	K2, K3
Generating solutions/Research	K3
Self-confidence	K3, K4
Attitude	K1, K3, K4
Success	K1, K4

Regarding the contributions of project competition to the students, K1, K2 and K3 stated that the projects contributed to students in respect to enabling them to associate science subjects to daily life. K1 expressed this contribution: *"Now, since the students at least see about the things that will occur in their life, they start to be more interested in the subject."* K2 responded, *"Contributions to students well it is important in respect to applying science in everyday life. The project objective already allows them to see the fields of application in everyday life."* Similarly, K3 expressed that project makes contributions to everyday life.

K2 and K3 mentioned that projects enhanced student motivation in terms of producing new projects and being interested in lessons. K2 expressed this contribution as, *"While starting the project, children start it reluctantly. However, as they get more involved in it and add something from themselves, children become more interested. They change their opinions and ideas."* K3 also assumed, *"It makes child happy, for instance making new products make child happy. Having a hand in the process makes child very happy."* Furthermore, K2 stated that children had a greater interest in science thanks to the project.

K3 mentioned that students could generate solutions to a problem through projects. During the interview, K3 stated that students improved themselves in terms of generating a solution to problems: *"The contribution of this is my work*

project to children is that they can generate solutions to problems, make machines, facilitate life, and become little scientists in person."

K3 and K4 stated that students had a higher level of self-confidence because of the project competition. K4 expressed as, *"Now, I realized the self-confidence of the child I brought from the village. I recognized the belief of 'I can succeed a great deal'. It was not impossible to go to Ankara, even if that is a rural child..."*

K3 also suggested that the projects improved the research skills of children: *"Also student is not merely school-based, but they can also get outside the school. They make researches outside and almost behave like a scientist. In this respect, it guides students to different activities outside school as well."*

K1, K3, and K4 believed that project competitions positively affect the attitudes of students towards science lesson. For instance, K1 stated that, "*Children spend a little more time with teachers, they are warmer, more sincere. Maybe they are interested in the lesson as long as they can actively use things that they may face in their life somewhere."*

K1 and K4 stated that science success levels of students increased with the project competition. For instance, K4 said, *"I can say that our students participated in the project clearly had a deep interest in science. I mean in all schools that I worked; all students had an interest in science. Their score on science lesson was the highest."* The codes are given in Table 12.

Tasks of teacher

Table 13. Participant codes concerning the question "What are the tasks of the teacher during project development for This Is My Work project competition?"

Codes	Participants
Topic-student selection	K2, K3
Counselling	K1, K2, K3, K4
Cooperation between school management and parents	K3
Motivating	K3, K4

As shown in Table 13, in response to the question *"What are the tasks of teachers during project development for This Is My Work project competition?"* K2 and K3 said that selecting the topic of project was the task of teachers, while K3 added that selecting students for the project was included in teachers' task as

well. K2 stated that, *"The task of the teacher is to select the project topic at first",* while K3 said, *"Teacher determines the students by paying attention to student success."*

All participants expressed that teachers had a counselling task in project competition. In this regard, K1 said, *"Now, under normal conditions, the task of teacher is only guiding the children. However, we are responsible for the entire project. We assign roles to children throughout the project. I mean you should do this by this time, you should do that by that time..."*

K3 mentioned that cooperation with school management and parents was among the tasks of teacher: "T*he awareness of school management could be raised with the extra efforts of teacher as well. In addition, students and parents are extra motivated by teachers."*

K3 and K4 stated that motivating was among the tasks of teachers in project competition. Hence, K4 explained that: "*When child is stuck with something, where the child becomes demoralized or despairs, getting child on their feet back again, saying I believe you, I trust in you, you do such nice things, you will succeed, and motivating them again."*

Project award

Table 14. Participant codes concerning the question "Do you find the awards given in "This Is My Work" project competition sufficient?"

Codes	Participants
Yes	K1, K2, K3, K4

While K1, K2, and K4 stated that they found the awards given in the project competition sufficient, K3 said that he did not find the awards given in previous competitions sufficient yet it is better now. K3 expressed that *"The awards were really insufficient in previous years in this competition. Particularly given awards were insufficient. Only immaterial awards made student happy. I mean given material awards weren't sufficient at all... but now they reinforced material awards as we saw at the meetings in this year. Again it is nice that both the material and immaterial awards given to child were enhanced."* The code was given in Table 14.

Project assessment process

Table 15. Participant codes concerning the question "Do you find the assessment process in "This Is My Work" Project Competition fair? Why?"

Codes	Participants
No/Lobbying	K1, K2 and K3
No/Private school privilege	K3, K4

As it is stated in Table 15, none of the participants stated that they found the assessment process of the project competition fair. K1, K2, and K3 suggested that lobbying was the reason, while K3 and K4 stated that private schools were privileged in project competition.

K1, who believed that lobbying was effective in the unfairness of project competition, expressed that: *"I didn't experience it personally, but as many friends say the lobbying activities are strong..."* Similarly, K3 said, *"I do not find the assessments so fair in this competition. Although we could express in full in project preparation stage, lobbying are still dominant..."*

K3 and K4 defended that private schools had more privileges in project competition. K3 expressed this situation: *"...if there are projects from private schools, their students definitely receive an award. Our students maybe outperform those children in central exams, but just for the name of their school, I believe that they have been seen on a higher level, so the project submitted by them received award more rapidly while our projects have been ignored."* Similarly, K4 said, "*... Students' father is a civil engineer and their mother is a mechanical engineer, when we examine their project, it is seen that certain projects weren't produced by students. Generally colleges, they are very lucky in this respect, we may have good ideas, but these are not realized so maybe it is not fair in that sense."*

Opinions, suggestions and requests

Table 16. Participant codes concerning the question "Do you have any opinions, suggestions and requests regarding This Is My Work" Project Competition? If yes, what are these?"

Codes	Participants
Fair assessment	K1, K2, K3, K4
Process	K3
Reaching the large masses	K4

K1, K2, and K3 stated that project competition should have a fairer assessment process in regard to opinions, suggestions and requests about the project competition. For instance, K1 said on fair assessment that, *"...Unbiased*

juries can be established for the assessment process since they should only evaluate the project itself. Thus, they shouldn't be able to see the individuals who prepared projects. In this way, project assessment would be fair."

K3 suggested at the end of the interview that project preparation process should last longer and the process itself should be also important with the product. He expressed: *"... A fairer process should be present, the process should last longer because it is not appropriate the preparation and submission of the project within two months. Already this process in PBL should last longer and should be assessed as well, the process is more important than the product in this respect...."*

K4 stated that project competition should reach the large masses. K4 expressed his thoughts on this issue: *"In this competition, a small organization should be held in each district... A possible exhibition should be at schools, an exhibition should be outside of the schools, and after that an exhibition in provinces, and after that an exhibition in the main region and finally in Ankara. Because it will be extended to a wider area, more people will go to see the projects."* The codes are given in Table 16.

Conclusion and Discussion

Project Participation

Participants stated that information given by MEB, encouragement of school management and given awards were effective in their participation in 'This Is My Work' project competition. All of the participants mentioned that information given by MEB and school management encouraged them to participate in project competition. Memişoğlu (2001) and Yavuz (2006) emphasized the importance of information given by MEB for participation in project competition. As mentioned in the literature, it is of particular importance that MEB informs teachers on the project competition in respect to focusing on and positively being guided into the project. Önen, Mertoğlu, Saka and Gürdal (2010) stated that teachers should be encouraged to participate in project competitions. In parallel with the literature, the researchers of this study also believe that encouragement is significant for participation in project competition. Furthermore, K3 stated that awards given in project competition are also important for participation. Tortop (2013) similarly stated that participants in their survey had stated that awards should be given for participation in project competitions.

Factors that determine project topic

Interests and wishes of the teachers and students, project cost and relevancy of project topic to everyday life were expressed to be the factors that determined project topics in project competition. Two of the participants (K1 and K4) stated that teachers determined project topics together with students. Similarly, Uzal et al. (2012) concluded in their study that teachers determine project topics together with students. On the other hand, Civelekoğlu and Öztürk (2010) concluded that teachers do not consult to student views while determining project topics. Öztuna-Kaplan and Diker-Coşkun (2012) obtained the finding that teachers had difficulty in creating project groups unless they considered the opinions of students. K2 stated that cost was among the factors that determined project topic. Similarly Öner et al. (2010) mentioned that cost was important in project preparation process and the planned budget for the project should not be exceeded. Finally, K3 mentioned that relevancy to daily life should be considered in determining project topic. Likewise, Katz and Chard (1992) stated that project topic should be relevant to daily life as such projects enhance meaningful learning of students. As a conclusion, interests and wishes of teachers and students, project cost and relevancy of project topic to everyday life are important in terms of effective project preparation process and an increased possibility to rank in project competition (Thomas, 2000).

Difficulties faced

It is understood that teachers have difficulty in project work in terms of compliance with schedule, applicability, relevancy to life, time, place, cost, student selection, school management and material. Highest rated opinions among these are the difficulties in respect to place and cost. The difficulties encountered by participants of this project show parallelism to those indicated in previous studies (Bolat et al., 2014; Güven, 2013; Mergendoller & Thomas, 2001; Öztuna-Kaplan & Diker-Coşkun, 2012; Rosenfeld & Ben-Hur, 2001; Thomas; 2000; Tortop, 2013). For instance, Öztuna-Kaplan and Diker-Coşkun (2012) stated that time and place should be allocated for project work within schools, otherwise students have to engage in their projects outside the school and in the remaining time from lessons. As a conclusion, researchers are of the opinions that projects that are in compliance with the curriculum in various science subjects (Çelik, 2003; Pektaş, Çelik & Köse, 2009), have high

applicability and low cost (Baki & Bütüner, 2009), are relevant to life (Gültekin, 2005), efficient in terms of time and place (Blumenfeld et al., 1991) should be carried out in order to overcome the difficulties encountered during project preparation process. Besides, students that could make a positive contribution to project work should be selected (Gültekin, 2005) and positive contribution of school management should be provided as well (Gültekin, 2005; Önen et al., 2010) to alleviate difficulties in project preparation process.

Contributions of seminar

The participants stated that they became aware of main changes by means of project guide booklet, they were informed on the project competition, they were demonstrated model projects and they were encouraged in respect to the applicability of award-winning projects in project seminars. Understanding that developing a project is not difficult thanks to demonstration of model projects is in parallel to the opinions of participants in previous studies (Uzal et al. 2012). On the other hand, the finding regarding understanding that project preparation is not difficult by means of seminars delivered does not comply with the finding of Güven (2013). In other words, Güven (2013) determined that teachers stated that they had difficulty in project preparation. Furthermore, K3 stated that information given in seminars makes a positive contribution to project preparation process. This finding shows resemblance with the findings of Uzal et al. (2012). Teachers in the study conducted by Uzal et al. (2012) stated that they learned the meaning and significance of project work through relevant seminars. As a result, it is believed that seminars for project competitions should be held more frequently as they guide teachers (Değirmenci, 2011; Memişoğlu, 2001; Önen et al., 2010).

Competency in science and pedagogical content knowledge

It was concluded that the knowledge of participants in science and pedagogics was not sufficient excluding K3 during 'This Is My Work' project competition. It was determined that K1 and K4 communicated with other science teachers while K2 use internet in order to eliminate these deficiencies. Özer and Özkan (2010) also determined that teachers use internet in order to eliminate their deficiencies in science and pedagogical content knowledge. Furthermore, it was concluded that K4 filled this deficiency via in-service trainings. Similarly, Önen et al. (2010) stated that in-service training is

important for project preparation. In the light of the present study, it is seen that teachers should have sufficient science and pedagogical content knowledge for an effective project. As mentioned by the participants as well, these deficiencies can be eliminated through internet, communication and in-service training. Furthermore, pre-service teachers should be raised well-equipped in terms of science knowledge and pedagogical content knowledge at education faculties in order to overcome this deficiency. It is believed that they would not have difficulty in project development skills when they become teachers by this means.

Project fields

K1, K3 and K4 stated that they participated in 'This Is My Work' project competition in biology while K2, K3 and K4 stated their participation field as physics and K2 and K3 stated theirs as engineering. Literature review reveals that participation in projects take place in the fields of biology (245), physics (392), engineering (72) and chemistry (220) (URL-1). It is seen that these participations mostly take place in physics field. The reason for this could be the relevancy of physics to everyday life, its intense social contents and its contribution in the association of science, technology, society and environment (Aikenhead, 2006).

Project based teaching

All of the participants stated that they partially followed PBL steps in project preparation. Similarly, participating teachers in the study conducted by Önen et al. (2010) stated that they partially followed PBL steps in project preparation process. The reason for this can be suggested to be that teachers mostly prefer traditional teaching method.

Student participation

K3 and K4 stated that they actively included students in the process in 'This Is My Work' project competition. K1, on the other hand, stated that he did not actively involve students in project preparation. Tortop (2013) determined that teachers do not actively involve students in project preparation process. Active participation of students is important for their enhanced critical thinking skills and creativity.

Selection criteria

K1 and K3 stated that teachers selected successful students while K2 and K4 selected students who could generate ideas for project topic in respect to participation in project competition. The reason for participants to determine these criteria can be stemming from their thinking that project would have a higher achievement rate with the participation of successful students that can generate ideas (Tutak et al. 2012). Furthermore, Tutak et al. (2012) determined in that teachers selected participants among successful students on a voluntary basis.

Contributions to students

It was concluded that the project competition made contributions to students in terms of association with everyday life, motivation, generating solutions, researching, self-confidence, positive attitude towards science lesson and success rate. Obtained findings show similarity with the literature (Demirhan & Demirel 2003; Milner-Bolotin, 2001; Serttürk, 2008). For instance, Tutak et al. (2012) suggested that 'This Is My Work' project competition made positive contribution to success rates and attitudes of students in mathematics lesson. Several issues need to be addressed in project preparation process so that projects can contribute to students. Applying the project to everyday life (Demirhan & Demirel, 2003; Gültekin, 2005), improving self-confidence of the student (Barrows, 1996; Memişoğlu, 2001; Önen et al., 2010), motivating and enhancing their researcher spirit (Blumenfeld et al., 1991; Demirhan & Demirel, 2003; Dexter & McGhee, 2007; Raghavan et al., 2001) could be included in these issues.

Tasks of teacher

It was concluded that the tasks of teacher in project competition included selecting project topics and students, steering the process and guiding students, collaborating with school management and parents, and motivating students. K2 and K3 stated that selecting project topic was among the tasks of teachers. Similarly, participants in the study of Ersoy (2006) mentioned that teachers should select the project topic. Similarly, Katz and Chard (1992), and Memişoğlu (2001) suggested that selecting project topic was the task of teacher. On the other hand, Değirmenci (2011) defends that students should select

project topic. As a conclusion, students should also be given the chance to determine the topic as long as students participating in project work can generate ideas and make a meaningful contribution in the project. On the other hand, if teacher believe that students are insufficient, only then s/he should intervene and determine the project topic by themselves. In respect to the counselling task, which is among the tasks of teachers according to the participants of this study, Kurak (2009) has also concluded that their participating teachers mentioned counselling and guiding among the tasks of teacher. K3 indicated that collaboration with parents and school management was included in the tasks of teachers. Similarly, it is suggested in the literature that the awareness of parents should be raised in terms of project preparation and PBL (Değirmenci, 2011; Ersoy, 2006; Memişoğlu, 2001). Although studies suggesting that PBL would enhance student motivation are found in the literature (Başbay & Ateş, 2009; Dexter & McGhee, 2007; Lam, Cheng & Choy, 2010; Pucher, Mense & Wahl, 2002), in this study, K3 and K4 suggested that the motivating factor in project works is the teacher. From this point of view, it should be known that teachers are important actors in project preparation process and the more effective they are in this project, the higher the quality of the project would be (Thomas, 2000).

Project award

All of the participants stated that they found the award given in the project competition sufficient. This finding is in conflict with the finding obtained by Tortop (2013). Tortop (2013) reached the finding that awards should be improved in order to enhance participation in project competition. Blenis (2000) suggested that all students participating in project competition should be given awards. As a conclusion, it is believed that awards given in project competitions have a positive effect on project participation. Therefore, presence of awards in the project is important in respect to motivation and participation.

Project assessment process

While all participants stated that assessment process of the project competition is unfair, K1, K2 and K3 suggested lobbying as the reason while K3 and K4 expressed that private schools were bestowed privilege. Similar findings are available in the literature (Tortop, 2013; Tutak et al., 2012). As a

conclusion, it is believed that project assessment project should be versatile for emergence of creative ideas and enhances productivity in scientific terms. Namely, including students and teachers as well as relevant academicians in project assessment jury could give an opportunity for a fairer assessment.

Opinions, suggestions and requests

The opinions, requests and recommendations of participants include that project assessments should be fair (all participants), project preparation period should last longer (K3) and the competition itself should be extended so that it can address to large masses (K4). Cook, (2003), Czerniak, (1996), Grote, (1995) and Tortop (2013) concluded that, according to the opinions of participants, projects should be assessed by impartial jury.

Suggestions

Suggestions for this study

1. Participation of teachers in project competition process on a voluntary basis and motivating speeches given by school management to participating teachers are seen to be important.
2. Shortcomings at schools such as laboratory and materials should be eliminated for effective project work and participation of teachers in project competitions.
3. Consideration of suggestions of teachers on 'This Is My Work' project competition by relevant departments of Ministry of National Education is important for increased efficiency of the process.
4. It is believed that clearly notifying students and teachers of project assessment process and selecting the assessment jury among stakeholders (teachers, students, managers, parents, etc.) is important.

Future Suggestions

1. Quantitative research method can be used to measure success and attitudes of students towards the project competition.
2. The study was conducted by using phenomenology design of the qualitative research methods in order to reveal the opinions of teachers. Action research can be carried out to generate solutions for the problems obtained from teachers' opinions.

3. This study is limited in terms of having only male participants in the study group. Therefore, the opinions of female participants could be received in relevant future studies.

4. The study is also limited as opinions of only teachers were received. Future studies could also include the opinions of school managers, students and parents.

5. Semi-structured interview was used as the data collection tool in the study. Document analysis in addition to interview could be employed for data triangulation.

6. A lesson on project preparation could be included in secondary school curricula for 'This Is My Work' project competition so that the time problems encountered by teachers during project development process can be alleviated.

Acknowledgements

This study was presented as an oral presentation at the IInd International Eurasian Educational Research Congress (EJERCongress 2015), Hacettepe University, Turkey, 08-10 June 2015.

References

Abbott, J. & Ryan, T. (1999). Constructing knowledge, reconstructing schooling. *Educational Leadership*, *57*(3), 66-69.

Aikenhead, G. S. (2006). *Science education for everyday life*. New York and London:Columbia University Teachers College Press.

Baki, A. & Bütüner, S. Ö. (2009). Reflections on the project implementation process in a primary school in rural area. *İlköğretim Online, 8*(1), 146-158.

Barrows, H. S. (1996). Problem-based learning in medicine and beyond: A brief overview. *New directions for teaching and learning*, 68, 3-12.

Başbay, M. & Ateş, A. (2009). The reflections of student teachers on project based learning and investigating self-evaluation versus teacher evaluation. *Procedia Social and Behavioral Sciences, 1*, 242-247.

Bell, S (2010). Project-based learning for the 21st century: skills for the future. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas, 83*(2), 39-43.

Blenis, D. S. (2000). The effects of mandatory, competitive science fairs on fifth grade students' attitudes toward science and interest in science. *Reports-research* (143), 1-27. http://files.eric.ed.gov/fulltext/ED443718.pdf

Blumenfeld, P.; Soloway, E.; Marx, R.W., Krajcik, J. S., Guzdial, M, & Palincsar, A. (1991). Motivating project based learning: sustaining the doing supporting the learner, *Educational Psychologist*, *26*(3&4), 369-398.

Brooks, J. G. & Brooks, M. G. (1999). The courage to be constructivist. *Educational Leadership*, 57(3), 18-24.

Bolat, A., Bacanak, A., Kaşıkçı, Y., & Değirmenci, S. (2014). The views of teachers and students about project of "This is my work". *Eğitim ve Öğretim Araştırma Dergisi, 3*(4), 100-110.

Civelekoğlu, M. Ş. & Öztürk, Ş. (2010). İlköğretim fen ve teknoloji dersinde proje tabanlı öğrenme yönteminin uygulanması ile ilgili öğretmen ve öğrenci görüşleri [Teachers and students observations on application of project based learning method in science and technology class of primary schools]. *İlköğretim Online*, *9*(3), 1189-1200.

Cook, H. M., (2003). *Elementary school teachers and successful science fair*. Unpublished Doctoral dissertation. The University of North Carolina, Greensboro. Umi: 3093864.

Creswell, J. W. (2009). *Research design, qualitative, quantitative, and mixed methods approaches (Third Edition)*. California: SAGE Publications.

Czerniak, C. M. (1996). Predictors of success in a district science fair competition: An exploratory study. *School Science and Mathematics*, *96*(1), 21-27.

Çelik, H. (2003). *Fen bilgisi ve fizik-kimya-biyoloji öğretmenlerinin iş doyumu*. Yayınlanmamış Yüksek Lisans Tezi, Kırıkkale Üniversitesi Sosyal Bilimler Enstitüsü, Kırıkkale, Türkiye.

Daley, B. J. (2001). Learning and professional practice: A study of four professions. *Adult Education Quarterly*, *52*(1), 39-54.

Değirmenci, Ş. (2011). *Fen ve teknoloji dersinde" Canlılar ve Enerji İlişkileri" ünitesinin öğretilmesinde proje tabanlı öğrenmenin öğrenci başarısına etkisi.* Yayınlanmamış Doktora Tezi, Selçuk Üniversitesi Eğitim Bilimleri Enstitüsü, Konya, Türkiye.

Demirhan, C. & Demirel, Ö. (2003). Project based learning in curriculum development. *Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi*, *3*(5), 48-61.

Dexter, S. & McGhee, R. (2007). *Small school, big results: leveraging technology and project-based learning in a high school case study USA exemplary technology-supported-schooling case studies project small school, big results: leveraging technology and project-based learning in a high school.* Retrieved from http://www.oecd.org/edu/research/2740241.pdf (accessed on 24 April 2015).

Duit, R. (1996). The constructivist view in science education. What it has to offer and what should not be expected from it. *Investigaçôes em ensino de ciências, 1*(1), 40-75.

Ersoy, A. (2006). *İlköğretim beşinci sınıfta teknoloji destekli proje tabanlı öğrenme uygulamaları.* Yayınlanmamış Doktora Tezi, Anadolu Üniversitesi Eğitim Bilimleri Enstitüsü, Eskişehir, Türkiye.

Grote, M. G. (1995). Science teacher educators’ opinions about science projects and science fairs. *Journal of Science Teacher Education, 6*(1), 48-52.

Gültekin, M. (2005). The effect of project based learning on learning outcomes in the 5th grade social studies course in primary education. *Educational Sciences: Theory & Practice, 5*(2), 517-556.

Gültekin, M. (2007). The effect of project based learning on learning outcomes in the fifth-grade science education. *Elementary Education Online, 6*(1), 93-112.

Güven, İ. (2013). Evaluation of prospective science and technology teachers’ experiences of project management. *Hacettepe University the Journal of Education, 1*, 204-218.

Helle, L., Tynjälä, P., & Olkinuora, E. (2006). Project-based learning in post-secondary education–theory, practice and rubber sling shots. *Higher Education, 51*(2), 287-314.

Kankelborg, A., (2005). *Rural science fair competition: levelling the playing field.* Unpublished Master thesis. Montana University, Montana. UMI: EP31005.

Katz, L. G. & Chard, S. D. (1992). The Project Approach. Approaches to Early Childhood Education. (ERIC Document Reproduction Service No. ED340518), 2nd Edition. (Eds.) James E. Johnson and J. Roopnarine. Merill Publishing Co.

Korkmaz, H. & Kaptan, F. (2002). The effects of project-based learning on elementary school students' academic achievement, academic self concepts

and study time in science education. *Hacettepe University the Journal of Education*, *22*, 91-97.

Krajcik, J. S., Blumenfeld, P. C., Marx, R. W., & Soloway, E. (1994). A collaborative model for helping middle grade science teachers learn project-based instruction. *The elementary school journal*, *94*(5), 483-497.

Kubinova, M., Novotna, J., & Littler, G. H. (1998). Projects and mathematical puzzles-a tool for development of mathematical thinking. I. Schwank, (Ed.), *European Research in Mathematics Education I, II* (53-63). Osnabrück: ISBN: 3-925386-51-3.

Kurak, D. (2009). *İlköğretim dördüncü ve beşinci sınıf öğrencilerinin yaptığı proje çalışmalarının öğretmen ve öğrenci görüşlerine göre değerlendirilmesi.* Yayınlanmamış Yüksek Lisans Tezi, Çukurova Üniversitesi Sosyal Bilimler Enstitüsü, Adana, Türkiye.

Lam, S. F., Cheng, R. W. Y., & Choy, H. C. (2010). School support and teacher motivation to implement project-based learning. *Learning and Instruction*, *20*(6), 487-497.

Lee, C. I. & Tsai, F. Y. (2004). Internet project-based learning environment: the effects of thinking styles on learning transfer. *Journal of Computer Assisted Learning*, *20*(1), 31-39.

Marshall, C. & Rossman, G. B. (2006). *Designing qualitative research (Fourth edition).* California: Sage Publications.

Matthews, M. R. (1993). Constructivism and science education: Some epistemological problems. *Journal of Science Education and Technology*, *2*(1), 359-370.

MEB (2005). *İlköğretim Fen ve Teknoloji Dersi (4-5. Sınıflar) Öğretim Program ve Kılavuzu,* Ankara: Devlet Kitaplar Müdürlüğü.

MEB (2014). *2014-2015 Yılı X. Ortaokul Öğrencilerine Yönelik Matematik ve Fen Bilimleri Bu Benim Eserim Proje Çalışması Başvuru Kılavuzu,* Ankara.

Memişoğlu, H. (2001). *Sosyal bilgiler dersi öğretiminde proje tabanlı öğrenme yaklaşımı*. Yayınlanmamış Doktora Tezi, Gazi Üniversitesi Eğitim Bilimleri Enstitüsü, Ankara, Türkiye.

Mergendoller, J. R. & Thomas, J. W. (2001). "Managing Project-Based Learning: Principles from the Field." Buck Institute for Education. Retrieved from

http://bie.org/images/uploads/general/f6d0b4a5d9e37c0e0317acb7942d27b0.pdf (accessed on 03 July 2015).

Merriam, S. B. (2009). *Qualitative research (Second edition).* San Francisco: Jossey-Bass. Miles, B. M. ve Huberman A. M., (1994). *Qualitative data analysis: An expanded source book*. 2nd ed. California, USA: Sage Publications, p. 27.

Mills, J. E. & Treagust, D. F. (2003). Engineering education - Is problem based or Project based learning the answer? *Australasian Journal of Engineering Education, 3*(2),1-16.

Milner-Bolotin, M., (2001). *The effects of topic choice in project-based instruction on undergraduate physical science students interest, ownership and motivation.* Unpublished Doctoral Dissertation, the University of Texas at Austin.

Önen, F., Mertoğlu, H., Saka, M., & Gürdal, A. (2010). The effects of in service training on teachers’ knowledge about project-based learning and competencies for conducting projects: Öpyep case. *Journal of Kırşehir Education Faculty*, *11*(1), 137-158.

Özer, D. Z. & Özkan, M. (2011). Evaluation of pre-service computer and instructional technologies training (CEIT) teachers’ projects about the fields of biology based on Project based learning approaches. *Uludag University the Journal of Education, 24*(1), 181-207.

Öztuna-Kaplan, A. & Diker-Coşkun, Y. (2012). Proje tabanlı öğretim uygulamalarında karşılaşılan güçlükler ve çözüm önerilerine yönelik bir eylem araştırması [An action research regarding the difficulties and solutions encountered in project-based teaching practices]. *Mersin University Journal of the Faculty of Education, 8*(1), 137-159.

Patton, M. Q. (2002). *Qualitative research and evaluation methods (Third Edition)* California: Sage Publications.

Pektaş, H. M., Çelik, H., & Köse, S. (2009). Developing of scale implementation difficulties on project based learning approach. *Journal of Kırşehir Education Faculty*, *10*(3), 111-118.

Perkins, D. (1999). The many faces of constructivism. *Educational leadership*, *57*(3), 6-11.

Pucher, R., Mense, A., & Wahl, H. (2002, October). How to motivate students in project based learning. In *Africon Conference in Africa, 2002. IEEE AFRICON. 6th* (Vol. 1, pp. 443-446). IEEE.

Raghavan, K., Coken-Regev, S. & Strobel, S. A. (2001). Student Outcomes In A Local Systemic Change Project. *School Science and Mathematics, 101*(8), 268-281.

Rosenfeld, S., & Ben-Hur, Y. (2001). *Project-Based Learning (PBL) in Science and Technology: A Case Study of Professional Development*. Science and Technology Education: Preparing Future Citizens. Proceedings of IOSTE Symposium in Southern Europe, 29 Nisan-2 Mayıs, Cyprus. (ERIC Document Reproduction Service No. ED466373)

Thomas, J. W. (2000). A review of research on project-based learning. Retrieved from http://www.newtechnetwork.org.590elmp01.blackmesh.com /sites/default/files/dr/pblresearch2.pdf (accessed on 20 March 2015).

Tortop, H. S. (2013). Overview of a national science fair in Turkey from the focus on administrators', teachers', students' views and quality of science projects. *Adıyaman Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 6*(11), 255-308.

TTKB (2005). *Fen ve Teknoloji Dersi Programı [Science and Technology Course Program]*. Retrieved from http://ttkb.meb. gov.tr/program2.aspx?islem=1&kno=25 (Accessed on 16 October 2014).

Tutak, T., Kaya, F., Kükey, E. & Gün, Z. (2012). *Bu benim eserim proje çalışmasına matematik alanından katılan öğrencilere yönelik öğretmen görüşleri [Views of the mathematics teacher for students who participate in this is my work project]*. X. Ulusal Fen Bilimleri ve Matematik Eğitimi Kongresi, 27-30 June, Niğde University, Turkey.

TÜBİTAK (2010). *Proje Rehberi [Project Guide]*. Retrieved from http://www.tubitak.gov.tr/tubitak_content_files/BIDEB/projerehberi_2204.pdf (Accessed on 16 October 2014).

URL-1 Ortaokul öğrencilerine yönelik matematik ve fen bilimleri proje yarışması proje bankası. Retrieved from http://basvurular.meb.gov.tr/ bubenimeserim/projebankasi.aspx *(Accessed on 13 May 2015).*

Uzal, G., Erdem, A., & Ersoy, Y. (2012). *Proje tabanlı fen/matematik eğitimi projesinden yansıtmalar-II: kazanılan yeterlikler ve öğretmen görüşleri [The reflections on the project-based science/mathematics education-II: acquired competencies and teachers' perceptions]*. X Ulusal Fen Bilimleri ve Matematik Eğitimi Kongresi, 27-30 June, Niğde University, Turkey.

Wilson, B. G. (1997). Reflections on constructivism and instructional design. In C. R. Dills & A. A. Romiszowski (Eds.), *Instructional development*

paradigms (pp. 63-80). Englewood Cliffs, New Jersey: Educational Technology Publications.

Yıldırım, A. & Şimşek, H. (2013). *Sosyal Bilimlerde Nitel Araştırma Yöntemleri [Qualitative Research Methods in Social Sciences].* (8th Edition). Ankara: Seçkin Yayınları, Turkey.