Peer-Reviewed Article

OJED
OPEN JOURNALS IN EDUCATION

Volume 12, Issue 2 (2023), pp. 189-210
Journal of Interdisciplinary Studies in Education
ISSN: 2166-2681Print 2690-0408 Online | https://ojed.org/jise

Online Project Writing Training in Turkey: Virtual Learning Competencies and Participant Opinions

Süleyman Yaman, Belgin Bal İncebacak, Aslı Sarsan Tungac
Ondokuz Mayis University, Samsun Turkey

ABSTRACT

The study is an outcome of the Project Preparation Course Project II for graduate students in the field of Educational Sciences conducted within the framework of the TUBITAK (the Scientific and Technological Research Council of Turkey) 2237-A program to support scientific educational activities. In this course, training is integrated to student-centered and work-integrated learning was conducted. This study aimed to improve the project writing skills of the participants with an online training that was designed to be integrated with work. The study group consists of 24 graduate students from 17 different universities who participated in the education program. The study is structured in the form of a one-group pre-test post-test experimental design. Data collection tools are the project-based virtual learning competencies scale and the structured interview form. Data analyzed by content analysis. At the end of the project, it was found that participants expressed positive opinions about all the processes involved in the project. At the end of the project, the work-integrated learning based online course was found to positively impact the participants' project based virtual learning competencies.

Keywords: Participant opinions, Project, Project process, Project types, Project writing, Work integrated learning

INTRODUCTION

Work Integrated Learning (WIL) is defined as educational activities that integrate the academic learning of a discipline with its practical application (Martin & Hughes, 2009). Patrick, Peach, Pocknee, Webb, Fletcher, & Pretto (2008) defined WIL as approaches and strategies that integrate theory and practice within a curriculum designed for a specific purpose. The goal of WIL is to provide integrated learning using a combination of academic and work-based activities. With WIL, students have the opportunity to integrate theory and practice by working in an environment that involves multiple tasks, based on interpersonal dynamics, with deadlines and training pressures. The WIL approach motivates students, helps them develop in-depth knowledge and thinking skills, allows for teaching in a more satisfying way, and enables more meaningful learning (Kay, Ferns, Russell, Smith, & Winchester-Seeto, 2019). Jackson (2013) stated that students who graduate in various fields lack the practical knowledge they will use in the field and stated that providing training supported by WIL would increase learning in addressing these deficiencies. From this aspect, following this process in practical training provides an advantage. In this study, the WIL approach was based on the practical project writing training prepared online. According to the Frascati Manual (2002), projects should be independent studies containing Research & Development (R&D) activities and innovation elements. Again, according to this guide, the purpose of projects should be to ensure the systematic resolution of scientific and/or technological uncertainty. Dede and Yaman (2003) defined the project as studies to eliminate obstacles in front of a person and the information obtained from these studies. In defining project-based learning, Solomon (2003) defined the project as a process of maintaining pre-planned activities that have goals for solving a problem and to use financial, technical and human resources to achieve these goals in limited location and duration.

Projects at the academic level are one of the important areas of research. In order to carry out projects, large, medium, or small budgets are needed according to the scope. For this purpose, support is obtained from various institutions to finance projects. Due to this, budgets vary depending on the size of the project. In countries that allocate less budget to research and development, it is always more difficult to write projects and get acceptance. The budget allocated by each country to research and development is directly proportional to the development level of the country. When the R&D budgets of states were examined on the website HowMuch.net, the first four countries that support projects the most and their support amounts are respectively; USA ($476.5 billion), China ($370.6 billion), Japan ($170.5 billion), Germany ($109.8 billion). Turkey is ranked 16th in the world in project support amounts ranking, with $15.3 billion. (URL-1,

2021). According to the data obtained from the source 'The Organization for Economic Co-operation and Development (oecd.org, 2021)', it was determined that Turkey allocated less budget to gross national domestic expenditures than many countries when compared to USA, OECD, China, and EU countries (URL-2, 2021). These data demonstrate that Turkey has a limited budget to support its R&D activities. Acceptance rates in the projects applied by researchers in Turkey are also negatively affected by this. Providing the greatest support to research activities in Turkey, the Scientific and Technological Research Council of Turkey (TUBITAK) (2020), low acceptance rates in academic projects between 2007 and 2019 also support this data. Additionally, according to the data obtained from The World Bank Group (https://data.worldbank.org/), when the total percentages of states gross expenditures for research and development between 1996-2019 are examined, it was seen that Turkey's budget spending increased between the years 1996-2017 but significantly decreased in the years 2018 and 2019 (URL-3, 2021). These rates actually affect the acceptance requirements of the projects. A lesser amount of budget naturally means more unacceptable projects. Another natural outcome of a limited budget is the support of higher-rated projects in the evaluation process. Because of this, even a small deficiency, mistake, or a lack of expression can result in the declining of the project, even if it is a very original and almost as qualified as other projects.

Projects at the academic level are one of the important areas of research. These projects offer several significant advantages, including knowledge generation, problem-solving skills, academic and professional development, and innovation and forward-looking research. Firstly, these projects contribute to the production of new knowledge and the advancement of existing knowledge. Students, researchers, and scientists can discover new information, validate existing knowledge, or expand the boundaries of current knowledge through theoretical and experimental studies. This knowledge encourages progress in relevant disciplines and contributes to the overall knowledge accumulation of society. Secondly, academic projects allow participants to enhance their problem-solving skills. Processes such as hypothesis formulation, data collection, analysis, interpretation of results, and effective presentation of findings foster critical thinking, analytical abilities, and a deep understanding of scientific methods. Additionally, academic projects contribute to the academic and professional development of students and researchers. These projects provide an opportunity for in-depth study on a specific topic and enable individuals to gain expertise in their respective fields. They also assist researchers in improving their work skills, presentation abilities, and written communication skills, thereby contributing to their success in academic and professional careers. Lastly, academic projects facilitate the exploration of innovative ideas and the pursuit of forward-looking

research. They encourage the pushing of boundaries and the undertaking of pioneering work. For all these reasons, academic projects hold great importance in the field of research. In conclusion, academic-level projects are an important component of research and play several significant roles in the research process. Projects serve important functions such as knowledge generation, development of practical skills, knowledge sharing, and establishing foundations for future research. However, projects are just one piece of the broader spectrum that encompasses research, and they work in conjunction with other components to ensure the integrity of the research as a whole.

Researchers in Turkey can prepare projects to be able to get funding from various institutions and organizations. These include the European Union Programs and Grants, Iskur (Turkish Employment Organization), Development Agencies, Cooperatives and Foundations, Small and Medium Enterprises Development Organization (KOSGEB), Industrial Incentives, TUBITAK (Scientific and Technological Research Council of Turkey) National Support Programs, Universities, Embassies, Consulates, and Civil Society Organizations (Ministry of Foreign Affairs-MFA, 2021; West Black Sea Development Agency -WBSDA, 2019; Eastern Mediterranean Development Agency-EMDA, 2021; Ankara Music and Fine Arts University -MGU, 2021). Although many institutions and organizations in Turkey provide support for projects, TUBITAK gives the most amount of support in terms of grants, making it the most applied institution for projects. Between 2007-2019, a total of 90,067 project applications of academic projects coded 1001, 1002, 1003, 1005, 3501, 1007 were made to TUBITAK, and only 16,672 of these projects were accepted. Considering that the ratio of accepted projects to applied projects is not even 1/5, the difficulty of finding resources. The problem addressed by this study is the limited budget and acceptance rates in research projects in Turkey, which pose challenges for researchers in obtaining resources and support. Therefore, this study was conducted to improve project writing skills and competencies among participants and to assess the effectiveness of an online applied project writing training program integrated with work, supported by TUBITAK 2237-A Scientific Educational Activities Support Program.

The research questions for this study:

How the online training does supported by TUBITAK impact the project writing skills of the participants?

How do the participants evaluate the processes involved in the online training supported by TUBITAK?

How does the online training supported by TUBITAK contribute to the development of participants' project-based virtual learning competencies?

How do the participants assess their improvement in project writing skills after completing the online training supported by TUBITAK?
How does the online training supported by TUBITAK influence the participants' experiences of work-integrated learning?

LITERATURE REVIEW

In order for a researcher to write a project, they must first know what the project is and determine its theoretical framework well. Kubinova, Novotna, & Littler (1999) defined "project" as a process in which the individual finds a solution and determines the steps to be taken for this solution. Considering the explanations above, a project can be defined as the process of trying to solve the problem that exists within a certain period for the solution of a specified problem. According to Baki & Bütüner (2009), having a clear understanding of the required content for each section in a project facilitates the process of writing projects. When preparing a qualified project, the relevant parts contained in the application forms must be written according to the required criteria. Even if the project subject may be very original, if it is not written according to the criteria, it may not be accepted because it is not expressed in the required manner. This makes it necessary to have at least a basic level of knowledge in project preparation. One of the most effective ways to gain knowledge is to gain theoretical and applied skills by participating in work-integrated trainings on this subject. This is because there is a lot of research, which demonstrates that applied training has higher impact levels (Önen, Mertoğlu, Saka, & Gürdal, 2010; Öztuna Kaplan & Diker Çoşkun, 2012; Timur & Imer Çetin, 2017).

Project-based learning is an approach in which applied work is conducted in an interactive way within a group or individually. In this approach, the student is responsible for his / her own learning and works both with the group and individually. In this aspect, the project also has a suitable structure for the writing process. The project writing training implemented with this study is structured to cover the process of project writing from the beginning to the end. Pinto & Prescott (1988) mentioned 10 stages for successful execution of project cycle processes. These are: 1. Determining the mission of the project, 2. Institutional support, 3. Planning, 4. Determining a target audience, 5. Determining project personnel, 6. Methodical steps, 7. Admission process, 8. Monitoring and feedback, 9. Communication, 10. Troubleshooting. Golini, Corti, & Landoni (2017) argue that the success of a project is determined by multiple factors, and the literature categorizes it into two main aspects: project success and project management success. When all these information are examined, it can be said that in order to provide an effective project management process, it is necessary

to have many skills in the application aspect as well as theoretical knowledge at each stage from the project application to the finalization stage. With this training, all aspects of the project management process are addressed in an integrated manner and structured with a work-integrated learning model. The aim is to create a comprehensive content that provides participants with all the knowledge and skills they may need. Pant & Baroudi (2008) explained that people's project-making skills can be improved through project trainings, emphasizing that the trainings given in universities are lacking in carrying out a successful project management process. This study aimed to improve the project writing skills of the participants with an online training that was designed to be integrated with work. For this purpose, developing the project writing competencies and the competencies included in the factors on the project-based virtual competence scale of the participants, with this course that was designed based on the work integrated learning approach was aimed. These competencies reveal the success level of an individual after the training they received. According to Pinto & Prescott (1988), knowing project cycle processes is an important step in qualified project writing. In this context, online applied project writing training based on integrated learning supported by TUBITAK 2237-A Scientific Educational Activities Support Program, was designed. The aim of this training is to teach the information that will be needed by those who are considering applying for a project, in a theoretical and applied manner; after the completion of the training, it is aimed to reveal to what extent participants benefited from this training, as well as their project preparation competencies. This study aims to test whether the project writing training, which is planned theoretically and applied, increases the project writing qualifications of the participants. For this purpose, a theoretical and practical training work integrated program was applied to the participants. Work integrated learning environments provide students with multidimensional learning opportunities: Motivates students, helps students develop in-depth knowledge and thinking skills, allows teaching in a more satisfying way and makes more meaningful learnings (Larmer, Mergendoller, & Boss, 2015). For details of the program, you can refer to the method section. At the end of the training, it is aimed to increase the qualifications of the participants.

RESEARCH METHOD

This study is structured as a weak experimental design, specifically utilizing a single-group pre-test post-test experimental design. The reason for using this design is the lack of an equivalent group in which data obtained from project participants is compared. There is no comparison (control) group, as participants do not take any lesson/lessons that overlap with the scope of this course throughout the entire training process. In this design, the application is made on a single group, and no attention is paid to randomness and matching when forming the groups (Cohen, Manion, & Morrison, 2000). The most important feature of this design is the direct application of the independent variable, which is expected to have an effect on the group. The absence of possible errors due to group differences or equivalences is a significant advantage for this design, while the inability to determine whether the difference that may occur is caused by factors other than the applied independent variable is one of its disadvantages. Accordingly, generalizability feature is considered to be low (Rubin & Babbie, 2017).

Sample and Data Collection

The course was attended by 24 graduate students in different fields of Educational Sciences. An online application form was created for the selection of participants and in addition to the project website, it was also published on various social media and applications were received. The application period, during which announcements were frequently renewed, lasted a total of 40 days and 157 applications were made. According to the selection criteria specified in the project proposal, criteria such as: a) Being at, at least a master's thesis stage and at most a doctoral course stage, b) Studying in different areas of field education or educational sciences, C) Not previously participating in a project in this area, d) Having a high transcript grade were taken into account. In addition to this basic criteria, gender, educational stage (master's or doctorate), characteristics such as studying at different universities and different fields of science were taken into account in order for participants to be balanced within the group according to the distributions in the application. As a result of the election done according to these criteria, the working group consisted of a total of 24 people, 19 of whom were women and 5 of whom were men, who studied in 12 different graduate programs of 17 different universities.

Process

The course lasted a total of 6 days. As part of the course, 13 academician from 7 universities provided trainings on different topics of preparing work-integrated projects. Online learning environments were created in which participants would also be active in the course and trainings and applications were conducted between the hours of 09.00-18.00. As in this study, trainings on writing projects

with the codes 2237-A and 2237-B, especially supported by TUBITAK, contribute to the preparation of proposals by the people who will apply for the project according to the appropriate criteria. During the preparation of this course program, the WIL approach was used to create content. This approach was chosen because it blends academic and work-integrated learning and provides an integrated learning opportunity. During the program, the participants were enabled to produce projects in the form of group work. Additionally, participants were encouraged to think about their own decisions and actions and to make practices in project writing related activities so that they could critically evaluate themselves. In applied and theoretical training, presentational teaching, inquiry-based teaching, WIL, problem-solving, and project-based teaching methods were used.

The daily schedules of the course are briefly described below:

1st Day: It started with the opening and introduction applications, it continued with the project and finding the idea of the project and the topics of general characteristics of the projects. The first day training was completed by examining the databases for the projects. At the end of the day, 4 groups, each containing 6 people, were formed taking into account the areas in which the participants were majoring in their graduate educations. A general explanation was given to the groups and it was stated that in the following days each group was supposed to come together with the group members and write their own project proposal.

2nd Day: International projects, COST, Erasmus +, Horizon 2020 and TUBITAK academic projects coded 1001, 1002, 1003, 1005, 1007, 3501 were introduced. In international projects, the aim is to support R&D and innovation projects. The aim of TUBITAK 's corresponding codes is to produce new information, to make scientific interpretations or to support projects that are in accordance with scientific principles to solve technological problems. Information about the relevant codes were provided. Later, information was given about the points to be considered during the writing phase through the application forms of these projects. At the end of the day, the groups came together and determined their project subjects.

3rd Day: An applied activity related to the determination of project writing skills and determination of character forces was carried out. Then, presentations were made about international university and institution supported projects and how to partner with these projects. In the evening, each project group came together in virtual classes and began to prepare their own project proposals.

Day 4: A practical creative writing training where the issues to be considered in the writing of the projects were discussed was given. Each group is then got together separately in virtual classes that were created for them. The three instructors involved in the project visited the virtual classrooms of each group,

listened to their discussions and made suggestions for developing their projects. In the last session of the same day, information was given about the legal and ethical principles of project budget creation and budget expenditures.

Day 5: Types and characteristics of scientific research projects (BAP) supported by universities were discussed. In the afternoon of the same day, information was given about the projects 4004, 4005, 4006 and 4007, which are Scientific and Society projects that are supported by TUBITAK. Science Society projects include raising the interest and curiosity of the target audience towards scientific issues, developing knowledge skills with innovative approaches, and supporting projects that will create awareness of knowledge and science in society.

Day 6: Project groups presented their proposals to 4 different instructors on the virtual panel system. After the presentation, the instructors rated the groups' project proposals based on the criteria of TUBITAK 's project panel evaluation system. A google form that was pre-created for scoring was sent to panelists after each project proposal was made. Group projects were evaluated by panelists in terms of methodology, value of originality, project management, team and research opportunities, and widespread impact. The scores of each group were sorted in order and the training process was completed by announcing how many points they received for the projects they wrote at the end of the training.

Research data was collected before and after the course. Information about data collection tools is given below:

Interview Form: By examining the relevant literature (Atalmış, Selçuk, & Ataç, 2018; Yamiç, 2019) to collect data in the course, the interview form was prepared. In this form, a total of 15 questions, which differed from each other before and after the course, were included. In the form, participants were asked questions about their project writing qualifications, changes in themselves after project writing training, and their reasons for wanting to write a project. A language expert and three field experts were consulted about the questions. Based on the suggestions, the number of questions was reduced to 10 by making various changes and edits to the form. The draft form was then prepared as an online form and sent to the participants one day before the starting date of the project and they were asked to fill it out. On the day of completion of the course, the participants were sent the final interview form and they were made to complete it.

Project-Based Virtual Learning Competencies Scale: The project-based virtual learning competencies scale, developed by Tuncer & Yilmaz (2013) and consisting of 22 items, is a Likert-type scale, meaning that the lowest score is 1 and the highest score is 5. The scale items are: “1: I strongly disagree“,” 2: I disagree“,” 3: I'm indecisive“,” 4: I agree“, and” 5: I strongly agree". The scale consists of 5 sub-factors. Factors are, respectively: project entry competencies,

project team-work competencies, project self-supervision competencies, project execution competencies and project finalization competencies. The Cronbach Alpha coefficient of the original scale was 0.86, while the reliability coefficients of the answers given by the participants of this course were calculated as 0.96 for pre-test and 0.92 for post-test.

Analyzing of Data

With the tools used in the research, qualitative and quantitative data were obtained. The qualitative data collected with the interview form was analyzed by content analysis. In content analysis, interview questions were analyzed by two researchers by simultaneously dividing them into codes. Then the researchers got together and compared the codes that are suitable to the themes. Using the formula developed by Miles & Huberman (1994), the percentage of correspondence of researchers was calculated and found to be 100%. This is because researchers individually have primarily named codes and themes. In the second step, researchers came together and determined common codes and themes by conducting discussions to ensure coder unity. The frequencies and percentages of the data were calculated and presented in the form of tables to correspond to the answer to each research question.

Content analysis is a qualitative research technique used to analyze textual data. In this study, content analysis was applied to analyze the qualitative data obtained from the structured interview form. It involves identifying themes, patterns, and categories within the data to draw meaningful conclusions. Content analysis was chosen as it allows for the systematic examination of qualitative data, enabling the identification of recurring themes and patterns in participants' responses. This approach helps to gain insights into participants' perceptions, experiences, and evaluations of the project.

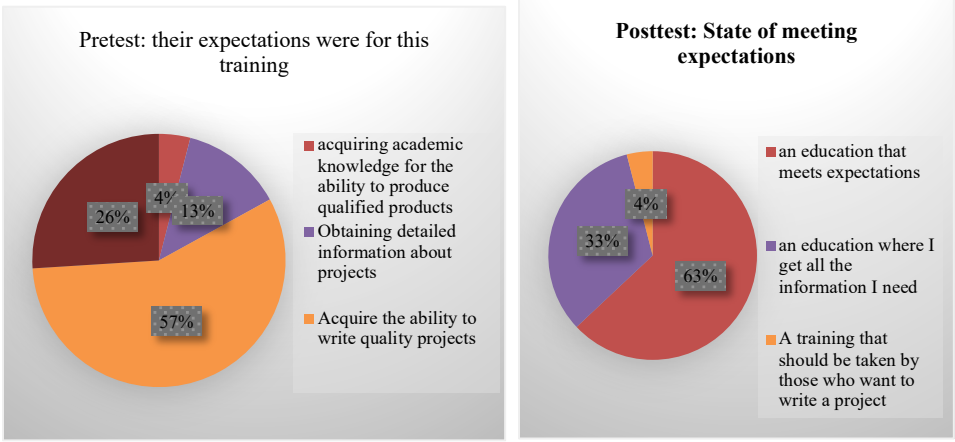
The quantitative data of the study was obtained using the graded scale. A computer-based analysis program was used to analyze this data. Due to the small number of participants, it was first examined, whether the assumptions of parametric tests were met. The resulting skew and kurtosis values for pre-test and post-test were respectively calculated as .48 and .94 and since the values are between -1.00 and +1.00, it was accepted that the data provided the normality requirement. Büyüköztürk (2007) stated that in the case of the number of participants in the group were less than 50, it would be appropriate to examine at the values of the Shapiro-Wilks test. For this study, it was determined that the Shapiro-Wilks test values were (sd = 24; p = .50), and provided the condition of normality. Although the number of participants was small, parametric statistical analyses were used, taking into account the data above. In addition, the confidence interval of the study was accepted as 95% and the .05 margin of error

was taken into account when conducting the analysis. Inferential statistics involves statistical techniques used to make inferences or predictions about a population based on sample data. In this study, inferential statistical tools were used to analyze the quantitative data collected on the project-based virtual learning competencies scale. These tools include methods such as t-tests, chi-square tests, and analysis of variance (ANOVA) to determine if there are significant differences or relationships between pre-test and post-test scores. These statistical analyses were utilized to assess the impact of the study on participants' project-based virtual learning competencies and to evaluate the effectiveness of the online training program.

RESULTS

In this Section, content analyses of the participants ' responses to the pre and post interview form are presented in frequency and percentage value themes. Quantitative data of the study were presented by descriptive analysis, in which intergroup comparisons were made. Participants were asked questions regarding their expectations for the training, their self-perceived competence in project preparation, and whether their expectations of project training were met. The answers provided by the participants were analyzed and presented accordingly. Prior to the commencement of the course, participants were specifically asked about their expectations for the training, and the analysis of their responses is depicted in the chart below:

Chart 1. Participants' Expectations from the Course



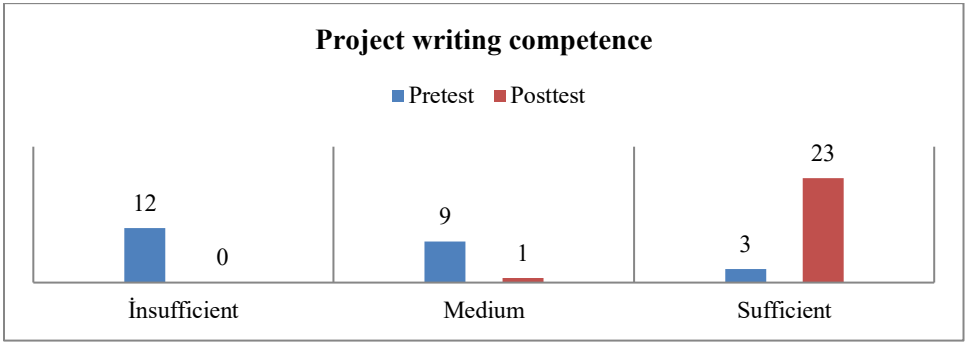
According to chart 1, it was determined that participants had high expectations for project preparation and demanded content that is in accordance with this, from the project team. It was seen that their greatest expectations for outcome of

the project was the ability to write quality projects. And the expectations of participants who were experienced in project writing and wanted to improve the aspects that they are not sufficient in, took second place. Participants ' requests for gaining information about projects in a general sense took the third place. It was determined that a small number of participants expected to acquire academic knowledge as well as project writing skills.

After the course was completed, participants were asked, whether their expectations of project training were met. Participants stated that their expectations from the training were fully met and that they received all the information they needed.

Before and after the course began, participants were asked, how competent they considered themselves in project preparation. Analysis of participants' responses is included in the chart below.

Chart 2. Participants ' opinions on their project writing competencies before and after the course



According to chart 2, half of the participants considered themselves incompetent in project preparation before the beginning of the training. It is noted that the proportion of participants who stated that they were competent enough to write a project was only 12.5%, while the proportion of participants who stated that they were moderately competent was 37.5%. 3 of the participants stated that they considered themselves qualified in preparing the project. As can be seen from the chart, almost all of the participants (96%) stated that they considered themselves competent enough for project preparation, while 1 participant stated that they were moderately competent. Some participants ' answers are presented below:

K21: “After training in project writing, I feel quite qualified and believe that I will make a project”

K12: “... before I came to training, I had preconceptions about writing projects, and to be honest I didn't have the courage, but now I saw that there was nothing to be afraid of and I had to try. I think I can write a project.”

Analyses of quantitative data obtained from participants are presented below.

Table 1: T-test Results Related to The Participants' Project-Based Virtual Learning Competency Scale Pre-Test and Post-Test Scores

Factor	Test	N	$\overline{X}$	S	sd	t	p
AYT	Pre-test	24	3.98	.61	.71	5.202	.000
	Post-test		4.75	.28			

According to Table 1, in the participants' project-based virtual learning competency scale scores, there was a significant difference between the pre-test and post-test scores, and the difference is in favor of post-test ($t(22)= 5.20$; $p<.05$). It can be said that students ' proficiency scores for project-based virtual learning increased by about 20%, and homogeneity levels also increased significantly. It can also be seen in the table that the level of competence of participants increased from the "I agree." level to the "I strongly agree." level. A participant's explanations before and after the project writing training, support the above quantitative finding.

K5: "…I have always felt incompetent in project writing because we have not acquired sufficient knowledge and experience in writing, executing and finalizing a project..."

K5: "I think I can prepare a project. Because I learned how to prepare a project report during the project process through the trainings I received. I drafted a project. When writing the project report, I saw my shortcomings thanks to the feedback given by the project team and by the instructors after submitting the project report."

As can be seen from these explanations, it is understood that participants saw improvement in themselves in terms of confidence in project preparation, after training.

After the project, participants stated that the training provided, contributed significantly to their personal development on project writing. They also stated that when writing a project after training, they saw all the stages of the project in detail and learned these stages well. Preliminary test and final test results for sub-factors of the participants ' project-based virtual learning competencies scale are included in Table 2.

In Table 2, it is seen that there is a significant difference in all factors in terms of the sub-aspects of participants ' project-based virtual learning competencies and the difference is in favor of post-test. Among the sub-factors, it was found that the largest difference between post-test-pre-test scores occurred in

"project execution competencies" and the smallest difference occurred in "project finalization competencies".

Table 2. T-test Results That Are Related to the Participants' Project-Based Virtual Learning Competency Scale Pre-Test and Post-Test Scores Are (N=24; sd=22)

Factors	Test	$\bar{X}$	S	t	p
Project Entry Qualifications	Pre-test	3.96	.64	5.20	.000
	Post-test	4.75	.28		
Competencies on Working with the Project Group	Pre-test	3.87	.70	4.67	.000
	Post-test	4.63	.41		
Project Self-Supervision Competencies	Pre-test	3.91	.87	4.02	.001
	Post-test	4.70	.39		
Project Execution Competencies	Pre-test	3.97	.66	5.30	.000
	Post-test	4.82	.31		
Project Completion Competencies	Pre-test	4.27	.63	3.11	.005
	Post-test	4.81	.37		

It was determined that participants ' scores increased from "I agree "to "I strongly agree" on all factors of the scale. Therefore, it was determined that participants saw their own level of competence in terms of all dimensions at the highest level after the project was completed. A participant's views on competence status are presented below:

K1: "Thanks to this project, I feel quite adequate. I also think that when I want to write projects, I can get help from the instructors I met."

Both qualitative and quantitative findings show that the training provided within the scope of the project has achieved its purpose from the aspect of the participants. Because both data showed that participants considered themselves more competent to write projects after the course was completed.

DISCUSSION AND CONCLUSIONS

The aim of the study is to determine whether work-integrated learning (WIL) based project writing training, which lasts six days between December 21 and 26,

2020, contributed to learning products. In this training, conducted in interactive environments online, it was possible for competent instructors in their field to share their knowledge and experience. All the findings of the course, in which participants who are studying in different fields also contributed to the process, show that the project has achieved its goal. Learning activities conducted, related to project writing throughout the course are designed so that students will need to learn all the necessary steps related to project writing and use them by blending them with previous information. The preparation of this design was based on the work integrated learning (WIL) approach. With this approach, participants critically evaluated themselves and their groups and performed all the tasks they had to do in practice. As a result of this practical training, it was observed that a high level of efficiency was obtained.

The most important finding of this study is that those who considered themselves incompetent or moderately competent in writing projects before the course began to consider themselves highly competent at the end of the course. Before the course, half of the participants explained that they considered themselves incompetent; while there were no participants, who stated that they were inadequate after the project was completed. This was supported by both qualitative and quantitative findings. Rook & Sloan (2021) stated that graduate students increased the success of their education with WIL and that these students stand out in work life with their practical learning outcomes. Similarly, they stated that participants received an adequate level of education through planned learning activities with WIL. Peten, Yaman, Vekli, & Çavuş, (2019) in their study to improve the skills of science teacher candidates who wrote/prepared projects for TUBITAK support programs, they concluded that existing projects were copied and original projects were not produced. The researchers suggested that the training provided in their study was effective in increasing participants ' skills and that people could be encouraged to write projects based on the fact that each group wrote an original project. Tatlı (2016) stated that many teachers in different branches did not write projects because they did not receive any training in project development. In addition, Baki & Bütüner (2009) stated that people were not enthusiastic about writing projects when project writing training was not done in an applied manner. The positive results of the practical training given in this course are consistent with the explanations of Baki and Bütüner.

After the project, participants stated that the training provided, contributed significantly to their personal development on project writing. They also stated that when writing a project after training, they saw all the stages of the project in detail and learned these stages well. Bieschke, Bishop, & Garcia (1996), stated that the participation of people in project writing and the implementation of

written projects contributed greatly to the development of people. Rook and Sloan (2021) stated that trainings designed with WIL programs improved quality in education and people better follow the process in practice. Jackson (2013) stated that students who graduate in various fields lack the practical knowledge they will use in the field and stated that providing training supported by WIL would increase learning in addressing these deficiencies. Şahin et al. (2018) stated in their study that graduates of graduate education should have the ability to write projects and reports by knowing the principles and stages of report writing. But they found that the vast majority of students at this stage do not have these skills. In their study, Timur & Imer Çetin (2017) concluded that science teachers do not have sufficient knowledge and skills for project development; they increase their level of competence through in-service training. As a result of this course, it was concluded that graduate students had low competence to write projects before project writing training; they significantly made up for their deficiencies after training. In other studies, supporting this result, Güven (2013) stated that teachers did not take a course related to project preparation in undergraduate education, while Zeren Özer & Özkan (2012) stated that teachers were not involved in project processes due to their lack of adequate in-service training. In addition to these, Onen et al. (2010), Oztuna Kaplan & Diker Coşkun (2012), and Timur & Imer Cetin (2017) stated that applied project training should be given in order to increase project writing. Similarly, there are studies that state that teachers should receive academic support in project writing (Aydın & Çepni, 2011; Aydın, Bacanak, & Çepni, 2013; Özel & Akyol, 2016). One of the other important findings of this study is that applied training directly contributes to the development of participants' project writing/preparation skills. Altiok, Yükseltürk & Üçgül (2018) concluded that experience in projects makes the person feel more competent in project preparation. The qualitative findings of this study also confirm this conclusion. In light of the results obtained, it is possible to say that participants who do not have sufficient skills and experience in writing projects considered themselves more competent after training. If a project lacks expression or is poorly defined, it may face challenges in terms of being understood or evaluated by reviewers or stakeholders. It may be difficult for others to grasp the purpose, scope, or significance of the project. This can potentially lead to the rejection or decline of the project proposal or hinder its overall success.

To create a project that is not void of this element, it is important to ensure that the project is well-expressed, clearly articulated, and effectively communicated. This involves providing a comprehensive and detailed description of the project's goals, research questions, methodology, expected outcomes, and potential impact. By addressing these aspects and clearly expressing the project's

significance and value, it becomes more likely to be considered acceptable and successful.

Participants stated that they will contribute to the development of both their personal and their institutional skills through the work-integrated training they received in this course. They noted that training from higher education instructors who provided training in the course and experienced with projects is effective and efficient in terms of learning. The results of the study in which Yamic (2019) consulted to science teachers on project preparation, are similar to the results of this study. In his study, Yamic concluded that project writing trainings contribute to personal and professional development, and that teachers with sufficiently equipped pedagogically, providing practice-based trainings, support teachers to be better equipped. Tatlı (2016) examined the teacher's views on the project development process and stated that project studies will contribute to the development of people, increase cultural interaction and increase student success. Similarly, in a study in which the administrator, executive and student views were taken, Atalmış, et al., (2018) concluded that projects benefit the institution, students and teachers in various ways.

Another result from this study is that participants receiving practical project writing and work integrated training have a significant difference in project-based virtual learning competencies. This difference can be considered as an indicator that participants ' basic knowledge of projects, their competence to work with the project team, their self-supervision in the project writing process, and their competence to execute and finalize the project have increased as a result of their achievements from this project. It would be useful to test this achievement as a result of working with a limited group, by reaching to more participants. The fact that the sample in this study is students at a certain stage of graduate education (Master's thesis or doctoral course) reduces the generalizability; therefore, the external validity. For this reason, it would be useful to compare the results by conducting project writing trainings in different and larger samples. In addition, it may be suggested to examine the long-term effects of project writing trainings by conducting longitudinal studies in which the future project application experiences of the people who participated in project writing trainings and the acceptance rates of these applications are examined.

IMPLICATIONS

Data obtained prior to the course showed that participants did not consider themselves competent to write projects. Participants' inexperience and lack of

knowledge about project writing processes can be stated as one of the main reasons why they consider themselves incompetent. Based on the result of this study, it is recommended that studies be carried out to increase the competence of graduate students in subjects such as project application and project management. As a result of this study, it has been shown that it is effective to provide applied, work-integrated training given by academicians who are experts in their field to ensure these competencies. In addition, courses aimed at increasing project writing skills can be added to undergraduate and graduate programs and these skills can be supported by the formal education process.

Within the scope of TUBITAK (2021) 1001-Scientific and Technological Research Projects Support Program, the importance of writing projects was stated by talking about the need for academicians writing projects in universities and that it was something seriously needed. Researchers who are not trained in project writing or do not get information from appropriate sources can make an effort to write projects with great enthusiasm. However, most of these efforts naturally result in failure; meaning, rejection of the project. Thus, it is important for people to develop their knowledge and skills by taking such trainings. For this purpose, the providing project preparation trainings starting from secondary school will contribute to the increase in the number and quality of projects.

Another the general recommendation of this study is that individuals participating in project writing trainings supported by TUBITAK are registered on a common system and their information is accessible through the researcher information system (ARBIS). If it is detected that the participants receiving such trainings make project applications to TUBITAK in the later process, it can be determined whether the trainings have achieved their purpose. In addition, this system can be used for people who prepare new projects to collaborate with people who receive these trainings. Normally, ARBİS has information about the registered people on what types of project codes they apply for, as well as whether their projects have been accepted or rejected. In addition to previous project applications, it is believed that opening the information of the projects, which they were a participant to the access of new applicants, will make a positive contribution. This way, this information, which is useful from the aspect of project managers and researchers, will also contribute to the development of the project culture in our country. Courses aimed to increase project-writing skills to undergraduate and graduate programs, and supported by the formal education process.

Acknowledgements or Notes

This study is an output of a project supported by TUBITAK (Scientific and Technological Research Council of Turkey)

REFERENCES

Altıok, S., Yükseltürk, E., & Üçgül, M. (2018). The investigation of postgraduate students' scientific research competencies and anxieties towards research in terms of various variables**.** *Journal of Higher Education and Science, 2,* 348-367.

Ankara Music and Fine Arts University (MGU, March 14). (2021). *National and international funds.*https://www.mgu.edu.tr/idari_birimler/bap/belgeler/projeler_ve_fonlar_sunum.pdf

Atalmış, E. H., Selçuk, G., & Ataç, A. (2018). The views of school principals, project executive teachers and students on TUBITAK 4006 projects. *Ahi Evran University Journal of Kırşehir Education Faculty, 19(*3), 1999-2020.

Aydın, M., & Çepni, S. (2011). Investigation of meeting the needs of teachers in a support program on Project-Based Teaching Method (PBTM) developed for science and technology teachers. *Journal of Turkish Science Education, 4,* 55-68.

Aydın, M., Bacanak, A., & Çepni, S. (2013). Analysis of science and technology teachers' needs related with project-based teaching method (PBTM). *Necatibey Faculty of Education Electronic Journal of Science and Mathematics Education, 7*, 1-31.

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

Bieschke, K. J., Bishop, R. M., & Garcia, V. L. (1996). The utility of the research self-efficacy scale. *Journal of Career Assessment, 4*(1), 59-75.

Büyüköztürk, Ş. (2007). *Data analysis handbook for social sciences*. Pegem Yayıncılık

Cohen, L., Manion, L., & Morrison, K. (2000). *Research methods in education* (5th Edition). London: Routledge Falmer. http://dx.doi.org/10.4324/9780203224342

Dede, Y., & Yaman, S. (2003). The status, importance and evaluation of teaching with projects in the science and mathematics instruction. *Gazi University Journal of Gazi Educational Faculty, 23*(1), 117-132.

Eastern Mediterranean Development Agency (EMDA). (2021, March 14). *Funds from international organizations.*https://www.dogaka.gov.tr/destekler/diger-destekler/uluslararasi-kuruluslara-ait-fonlar

Frascati Manual (2002; April 25). *The measurement of scientific and technological activities. Frascati Manual 2002*. Proposed Standard Practice for Surveys on Research and Experimental Development, OECD: TUBITAK https://www.tubitak.gov.tr/tubitak_content_files/BTYPD/kilavuzlar/frascati_tr.pdf

Golini, R., Corti, B. & Landoni, P. (2017). More efficient project execution and evaluation with logical framework and project cycle management: evidence from international development projects, *Impact Assessment and Project Appraisal, 35(*2), 128-138, DOI: 10.1080/14615517.2016.1239495

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

Jackson, D. (2013). The contribution of work-integrated learning to undergraduate employability skill outcomes. *Asia-Pacific Journal of Cooperative Education, 14*(2), 99-115.

Kay, J., Ferns, S., Russell, L., Smith, J., & Winchester-Seeto, T. (2019). The emerging future: innovative models of work-integrated learning. International Journal of Work-Integrated Learning, *20*(4), 401-413.

Kubinova, M., Novotna. J., & Littler. G. H. (1999). *Projects and mathematical puzzles: A tool for development of mathematical thinking.* Proceedings of the First Conference of the European Society for Research in Mathematics Education *I.II: Group 5*, 53-63.

Larmer, J., Mergendoller, J., & Boss, S. (2015). *Setting the standard for project based learning*. ASCD.

Martin, A., & Hughes, H. (2009). *How to make the most of work integrated learning: A guide for students, lecturers & supervisors*. Massey University.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis*. London, Sage Publications.

Ministry of Foreign Affairs (MFA). (2021, March 14). *EU programs calls for proposals.* https://www.ab.gov.tr/ab-programlari-hibeleri_101.html

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.

Özel, M., & Akyol, C. (2016). Problems, reasons, and solutions faced in preparing projects. *Gazi University Journal of Gazi Educational Faculty, 36*(1), 141-173.

Öztuna Kaplan, A., & Diker Coşkun, Y. (2012). An action research on the difficulties and solution suggestions in project-based teaching practices. *Mersin University Journal of the Faculty of Education, 8*(1), 137-159.

Pant, I., & Baroudi, B. (2008). Project management education: The human skills imperative. *International Journal of Project Management*, *26*(2), 124-128.

Patrick, C.-J., Peach, D., Pocknee, C., Webb, F., Fletcher, M., & Pretto, G. (2008). *The WIL report: A national scoping study.* Queensland University of Technology. https://eprints.qut.edu.au/44065/

Peten, D. M., Yaman, F., Vekli, G. S., & Çavuş, M. (2019). Improving preservice science teachers' ability to write/prepare projects to TUBITAK grant program. *International Journal of Social Sciences and Education Research, 5*(1), 78-90.

Pinto, J. K., & Prescott, J. E. (1988). Variations in critical success factors over the stages in the project life cycle. *Journal of Management, 14*(1), 5-18.

Rook, L., & Sloan, T. (2021). Competing stakeholder understandings of graduate attributes and employability in work-integrated learning. *International Journal of Work-Integrated Learning*, *22*(1), 41-56

Rubin, C., & Babbie, S. (2017). *Research methods for social work* (9th Edition). Cengage.

Şahin, Ş., Ökmen B., Boyacı Z., Kılıç A., & Adıgüzel A., (2018). Needs analysis of curriculum and ınstruction master degree program. *Yükseköğretim ve Bilim Dergisi, 8*(3), 502-511. https://doi.org/10.5961/jhes.2018.291

Solomon, G. (2003). Project-based learning: A primer. *Technology and Learning Dayton, 23*(6), 20-20.

Tatlı, Z. (2016). Teacher's opinions about project development processes. *Journal of Education Faculty, 13*(1), 631-656.

The Scientific and Technological Research Council of Turkey (TUBITAK, March 5). (2019). *TUBITAK Annual Report 2019*. Received from: https://www.tubitak.gov.tr/sites/default/files/18842/tubitak_2019_yili_faaliyet_raporu.pdf

The Scientific and Technological Research Council of Turkey (TUBITAK, March 3). (2020). *TUBITAK Research Support Programs Presidency.*https://www.tubitak.gov.tr/sites/default/files/19970/ardeb_tanitim_sunumu_2020_0.pdf

The Scientific and Technological Research Council of Turkey (TUBITAK). (2021, March 14), 1001-Scientific and Technological Research Projects Support Program, https://www.youtube.com/

Timur, B., & İmer Çetin, N. (2017). Science teachers' competencies towards developing project: the effect of ın-service teacher education program. *Journal of Kırşehir Education Faculty, 18*(2), 97-111.

Tuncer, M., & Yılmaz, Ö. (2013). Development of the scale of project based virtual learning qualifications. *Elementary Education Online, 12*(1), 109-119.

URL-1 (2021, March 25). *Research & development spending by country.* http://howmuch.net/articles/research-development-spending-by-country

URL-2 (2021 March 25). *Gross domestic spending on R&D.* https://data.oecd.org/rd/gross-domestic-spending-on-r-d.htm

URL-3 (2021 March 25). *Research and development expenditure* (% of GDP). https://data.worldbank.org/indicator/SE.XPD.TOTL.GD.ZS?end=2018&start=2018&view=map&year=2019

West Black Sea Development Agency (WBSDA). (2019, March 14). *Institutions and organizations that provide project support in our country*. https://bakkakutuphane.org/upload/dokumandosya/proje_destek_rehberi.pdf

Yamiç, Y. (2019). *Determination of Opinions of science teachers about preparing projects.* (Unpublished Master Thesis), Trabzon University, Trabzon.

Zeren Özer, D., & Özkan, M. (2012). The effect of project-based instruction on science process skills of pre-service science teachers. *Journal of Turkish Science Education, 9*(3), 119-130.

BELGIN BAL INCEBACAK, PhD, is Associate professor doctor in the Faculty of Education, University Ondokuz Mayis. Her major research interests lie in the area of academic mathematic, academic project, higher education research and entrepreneurship. Email: belginbal33@gmail.com

SULEYMAN YAMAN, PhD, is professor doctor in Ondokuz Mayıs University, specializing in science education. His research interests primarily revolve around the field of science education, focusing on topics such as curriculum development, teacher training, and student learning outcomes. With extensive experience and expertise in the field, Prof. Dr. Yaman is dedicated to enhancing science education practices and promoting effective teaching strategies.
Email: slymnymn@gmail.com

ASLI SARISAN TUNGAC, PhD, is research assistant doctor in the Faculty of Education, University Ondokuz Mayis. Her major research interests lie in the area of academic science, academic project, higher education research and enterprenurship.
Email: aslisarisan@gmail.com

Manuscript submitted: ***July 1, 2022***
Manuscript revised: ***May 5, 2023***
Accepted for publication: ***July 7, 2023***