2018-1-TR01-KA202-059252

Design, Development, Implementation and Assessment of Skill Formation Process in the Frame of VET for R&D Staff

The implementation process of the "Intellectual Output 3: R&D and Innovation e-Platform and e-Learning Software"

Abstract

As a result of the previous intellectual output of the project, IO2, the curriculum of the e-learning program was obtained and e-platform for R&D staff was constructed. After investigating the open literature and open sources, it was deduced that there was no such a program and platform which help R&D staff in order to learn and discuss on these issues. Within this IO of the project, this gap was aimed to be full-filled. Thanks to the developed curriculum within the e-learning program and e-platform, a great opportunity for a wide group of R&D staff from different disciplines who are interested in R&D and innovation will be satisfied in order to improve their job-related skills.

In this e-learning program, a new curriculum in which there are ten fundamental courses which are developed in order to improve knowledge and research skills of R&D staff. By means of the constructed e-platform, there will be opportunities for collaboration and cooperation with each other. In this way, R&D staff will have a chance to communicate with each other in order to improve their knowledge and to share their experience on R&D facilities (https://e-rd.org/).

This study was supported by European Union project under Erasmus+ KA202 - Strategic Partnerships for vocational education and training with the title of "Design, Development, Implementation and Assessment of Skill Formation Process in the Frame of VET for R&D Staff" and the reference number of "2018-1-TR01-KA202-059252".

1. Introduction

In today's world, where science and technology fields are experiencing new developments day by day, R&D has the undeniable importance both in the private sector and in the countries. The importance and value of knowledge are increasing rapidly, while innovation is becoming the key to competitiveness.

In this project, it is aimed to improve the work-based skills of engineers and the personnel working under R&D by implementing an e-learning program. As a well known fact, the competitiveness and the sustainability of the industrial companies highly depend on designing and producing high-technology products and this is only possible with high-quality R&D studies. It is crucial to train the R&D staff working in the industry about the processes starting from literature survey to final product. For this reason, instead of classical methods, a new e-learning program was proposed herein. The e-learning program and the e-platform will remove time-space constraints and will be an example of vocational and technical open-education.

It is observed that the engineers working in the industry are deficient on R&D and innovation subjects and that the vocational education required under these headings is not given to the engineers at the undergraduate level and the education given at the graduate and even doctorate levels is insufficient. By means of the proposed e-learning program and the e-platform, the creation of an expanded international joint vocational training curriculum, the development of ICT-based innovative and effective and sustainable tools will be staisfied. Also, all the observations and given data serves this priority of the program guide: “Further strengthening key competences in initial and continuing VET (especially literacy, numeracy and digital) including common methodologies for introducing those competences in curricula, as well as for acquiring, delivering and assessing the learning outcomes of those curricula; enhancing access to training and qualifications for all, with a particular attention to the low-skilled, through continuing VET, notably by increasing quality, supply and accessibility of continuing VET, validation of non-formal and informal learning, promoting work-place learning, providing for efficient and integrated guidance services and flexible and permeable learning pathways.”

“This project is funded by the Erasmus+ Program of the European Union. However, European Commission and Turkish National Agency cannot be held responsible for any use which may be made of the information contained therein”

2. The Utilized Methodology

As a result of IO1 “Needs analysis survey” and IO2 “Curriculum on R&D and innovation”, the fundamental courses that are needed by R&D staff was determined and a new curriculum was constructed. For the design stage of the curriculum, Dick and Carey's curriculum design model was applied, which included a set of events and phenomena in which the designer identified learning objectives and instructional strategies to achieve those goals. The courses have been decided as a result of the need analysis received from the questionnaire form applied to R&D staff. The curriculum has been prepared by Target TTO, IBOX, VITECO, MAN and İstanbul University Cerrahpaşa. Within the scope of stated activities, it was foreseen that the e-learning program had ten (10) fundamental courses. These courses have been shared evenly among Target TTO, IBOX, VITECO and İstanbul University Cerrahpaşa according to their areas of expertise, and then the appropriate instructors who are experts in their area have been determined and the needed video materials such as camera, green curtain, microphone, proper shooting studios, etc. have been prepared. After the video shootings, their post-processing was carried out.

The topics of ten courses and the corresponding organization leader selected among project partners for video shooting are listed below:

1- Introduction to R&D (IBOX)
2- Experimental Product Design – DFX (IBOX)
3- Business Model (VITECO)
4- TRIZ (Target TTO)
5- Intellectual Property Rights (Target TTO)
6- Industry 4.0 (Target TTO)
7- Data Analysis and Statistics (Target TTO)
8- Problem Solving Approach (İstanbul University Cerrahpaşa)
9- Project Development Stages and Techniques (İstanbul University Cerrahpaşa)
10- Project Management (İstanbul University Cerrahpaşa)

“This project is funded by the Erasmus+ Program of the European Union. However, European Commission and Turkish National Agency cannot be held responsible for any use which may be made of the information contained therein”

During the preparation of e-learning program and video shootings, the main issues which are listed below were followed such as:

1. Determination of course topics according to need analysis of e-R&D Projects
2. Distribution of the tasks for the video shootings of the courses among partners
3. Creating the content of the courses
4. Finding out suitable trainers based on course content
5. Setting the standards for video shootings of courses
6. Beginning of the video shootings
7. Making the post-production of video shootings of completed courses (camera cut editing, sectioning etc.)
8. Embedding the document of course presentation used by trainers on course videos
9. Extraction of subtitles of courses that have completed Cam-Cut editing and Sectioning processes
10. Converting transcript files from partners to subtitle file (.srt)
11. Control of text errors that occur during subtitle conversion
12. Embedding the subtitles on course videos
13. Time synchronization control of subtitles
14. Quality control of post-processing course videos
15. Transmission of all courses 'transcript and subtitle files to partners' languages (Turkish, Spanish and Italian)
16. Preparing the translated subtitle files (.srt)
17. Uploading all videos to the web for sharing on the e-R & D platform

3. Results and Discussion

After constructing e-learning program embedded into e-platform (https://platform.e-rd.org/), a pilot training was carried out in order to receive feedbacks from the users and to perform an assessment survey about the curriculum. All these participants completed the whole of the e-learning program. Thirty-two R&D staff participated in the program. The distribution of these participants is given in Fig. 1. There is also a forum site in the e-platform for R&D staff in order to collobrate and to share their experineces (https://platform.e-rd.org/forum).

"This project is funded by the Erasmus+ Program of the European Union. However, European Commission and Turkish National Agency cannot be held responsible for any use which may be made of the information contained therein"

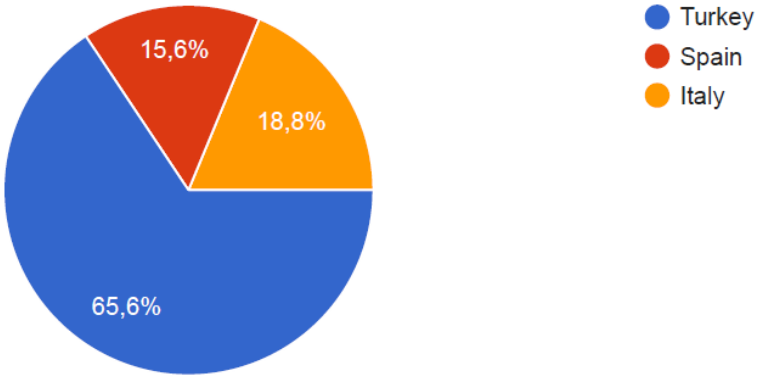

Figure 1. The distribution of the participants

In the assessment survey, Likert scale was used in the range from 1 to 5. Scale 1 means "strongly disagree" and scale 5 belongs to "strongly agree". In the survey, the opinions of the participants about the training, the trainers and the global satisfaction of the courses were measured (in Table 1).

Table 1. The assessment survey for the participants about the e-learning program

Rate from 1 (Strongly Disagree) to 5 (Strongly Agree)					
RATE THE TRAINING ACTIONS	**1**	**2**	**3**	**4**	**5**
Adequacy of information received					
Adequacy of the course duration					
Usefulness of the contents					
Help and attention to the student					
Operation of the virtual classroom					
Usefulness of the virtual classroom					
Understanding of the course structure					
Consistency of the course content with the objectives					
Confidence level for completing the knowledge or skill presented					
Enjoyment of the course					
RATE THE TRAINERS					
Expository clarity					
Quality of teaching material					
Length of the training content					
GENERAL CONSEQUENCE					
Global satisfaction of the courses					

"This project is funded by the Erasmus+ Program of the European Union. However, European Commission and Turkish National Agency cannot be held responsible for any use which may be made of the information contained therein"

The training was assessed from the participants. 78.1% of them found information received to be adequate. But 15.6% and 6.3% of the participants had neutral and disagree opinions, respectively. The course duration was found to be quite enough by 71.9% of the participants. The duration of each course was almost 60 minutes. However, in order not to distract the learners and not to make the subject boring, all courses in the e-learning program were divided into sub-titles of 4-5 minutes and it is possible to watch them at different times. Moreover, 3.1% of the learners thought sufficient about the course duration. However, 25.1% of them found it unsufficient. The usefulness of the courses was also another important parameter. More than 90% of the participants stated that all courses were very useful. Unfortunately, 9.4% of them had negative opinion about the courses. 87.6% of the learners said that the content of the courses were very helpful in their R&D field and these courses guide them in their R&D studies. Only 6.2% of the learners had a negative opinion on the operation of virtual classroom. However, the usefulness of the virtual classrooms were said to be quite enough by 87.5% of them. The courses were quite understandable for 87.5% of the participants. 12.5% of them had neutral opinion about the understanding of the courses. It was declared by 93.8% of the participants that the course contents were consistent with the program objectives. The level of confidence in completing the presented knowledge or skill was approved by 84.4% of the participants. 84.5% of the participants were satisfied with all the courses and found the course contents interesting and enjoyable.

In the second group of the assessment survey, the success of the trainers was measured. In this group, there were three questions in order to assess the trainers in terms of their expository clarity, the quality of teaching material and the length of the training content. Herein, 81.3% of the participants said that the trainers had very explanatory clarity in their lectures. However, 18.7% of them had neutral opinion. The quality of teaching material of the trainers was found to be quite good by 84.4% of the participants. %6.3 of them did not agree about it. The remaining had neutral opinion. The length of the training content was also considered in this section. 78.2% of the participants found the length of the prepared training content by the trainers quite enough.

The last part of the assessment survey belongs to the global satisfaction of the courses. The three quarters of the participants agreed on the global satisfaction of the courses. 15.6%

"This project is funded by the Erasmus+ Program of the European Union. However, European Commission and Turkish National Agency cannot be held responsible for any use which may be made of the information contained therein"

of them gave the sclae of 3 and had neutral opinion while the remaining ones had negative opinion as can be understood form Fig. 2.

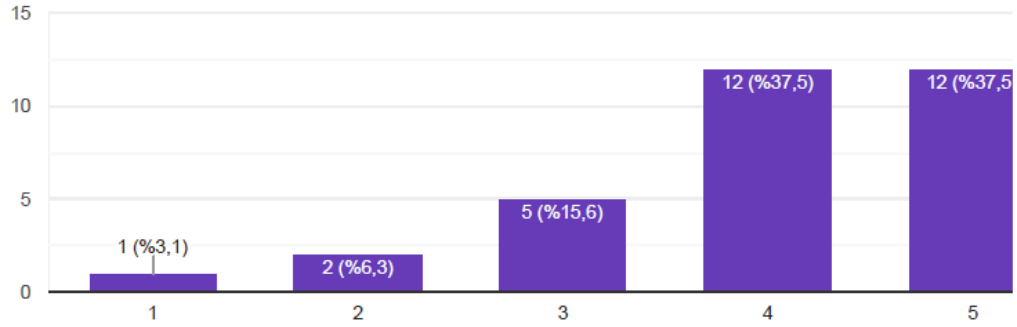

Figure 2. Results of the assessment survey on the global satisfaction of the courses

3. Conclusion

The constructed e-learning program and e-platform are very useful and helpful interfaces for R&D staff. They serve R&D staff to think critically, to solve problems rapidly and efficiently, to create, to design, to perform experiment, to make statistical analysis, to collaborate and to share their experiences on the specified platform. It is a fact that R&D staff's skills will improve day by day with this proposed e-learning program. Furthermore, thanks to the developed e-platform, it can be deduced that R&D staff will have a chance to cooperate and to share their experiences with each other.

"This project is funded by the Erasmus+ Program of the European Union. However, European Commission and Turkish National Agency cannot be held responsible for any use which may be made of the information contained therein"