

Key Action: Cooperation for innovation and the exchange of good practices
Action Type: Strategic Partnerships for vocational education and training

Project Title

Learning by Interactive three dimensional (i3D) in VET

Good practice example

Project Coordinator

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Topics New innovative curricula/educational methods/development of training
courses ; International cooperation, international relations, development
cooperation ; ICT - new technologies - digital competences

Project Summary

The digital transformation of Industry 4.0 has a significant impact on both vocational training, academic training, technical curricula and training in production environments. Production systems that are rapidly digitizing and expect new skills and competencies from their employers. At the same time, companies forced to take precaution because of new technological advances such as the Internet of things, wearable and augmented reality, the advancement of workplace learning and education towards Industry 4.0. On the one hand, there is a strong need to educate and strengthen the workforce due to the change in technology, while on the other hand, there are risks and challenges that must be overcome to motivate employees for this change. Lifelong learning and the development of professional competence is always a problem. This problem has continued until today. Therefore, education and training should be effective, efficient and attractive, and learning processes need to be improved.

With this project, it is aimed to model vocational and technical education curricula with AR / VR technology in order to make the difficult and complex mechanisms understandable, realistic and motivating. At the same time, it is aimed to prevent occupational accidents in hazardous occupations, to reduce scrap costs and to improve production quality. It is aimed to provide a vision to companies and vocational education institutions about the emerging opportunities by investigating the effects of the new digital individual learning model on workplace learning and education. In order to achieve this aim, Hydraulic-Pneumatic circuit elements, which are used in different sciences such as machinery, electrical-electronics, construction and automation engineering, have been converted to user decision supported digital content. Users can use these contents individually and perform their individual learning in any digital environment regardless of time and space. There are two Intellectual Outputs in the project:

1-10 hydraulic and pneumatic circuit elements are modeled with Augmented Reality (AR) technology and textbooks are developed for use in vocational education, engineering education and factory academic education departments. The textbook is prepared in Turkish, English, Italian, Hungarian and Polish. In the Augmented Reality (AR) textbooks of Based Hydraulic and Pneumatic, there was 10 hydraulic and pneumatic course content supported by user decision. To assist students in the learning process, "Gear pump, Vane pump, Piston Pump, Pneumatic Piston, And Valve, Or valve, Timing valve, Air filter, Lubricator, Pressure control valve, Quick Exhaust Valve, Check valve and 5/2 Direction control valve are modeled and supported by AR. People can examine, detonate, assemble and simulate the operating principle of the hydraulic and pneumatic contents of the mechanical systems presented in the book by using mobile phones or tablets.

2-Virtual Reality (VR) based training laboratory consisting of workstation computer, virtual reality glasses, sensors, VR controls, 3D stereo glasses, projection, and sound system has been established for the labor force training of Türk Traktör factory. In the VR learning environment, real products that have each of at least 90 components and be used hydraulic circuit elements are modeled as impressive, immersive and motivating to be used for training workers. The company developed technical sign language for the use of the hearing impaired employees and the training content was supported by the sign language translator. These products have been determined by considering customer complaints and internal quality reports with the quality unit of the company. 70 hearing impaired employees, more than 400 workers, trainee students, tractor technical service employees, and visitors have used the applications in this laboratory. The company made additional investments in VR contents as a result of the research activity carried out within the scope of the project's output-2.

Within the scope of Output-2, the effect of VR training contents on learning performances of factory field workers who had no previous assembly and VR experience was investigated. The research was carried out with 112 volunteer field employees working at TürkTraktör Ankara Facilities. In the research, random design with

pretest-posttest matched control group and random design with posttest control group were used. In the experimental and control groups of both designs, technical staff of 28 company employees took part. One of the group was trained with VR-supported training content and the other group was educated according to traditional methods with the foreman. The group of 56 people was randomly chosen and some of them performed assembly with VR contents and some of them with traditional methods. The results of the research showed that the use of VR content in education is much

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