

DTMER

Digital Tools for Manufacturing training and Education Programmes

Project n° 2020-1-DE02-KA226-VET-008289

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ABOUT THIS REPORT

This document was developed in the framework of the **DITMEP** project by RSC with the collaboration of the rest of the partners.

Project period

May 2021 – April 2023

Goal

The goal of the project is to develop and improve manufacturing training, in particular Risk prevention courses, generating digital capabilities on the methodology (through e-learning, gamification and augmented reality experiences) for educators and trainees.

In parallel, it was also fetched the collaboration between Universities, Vocational training centers and private companies in selecting the most appropriate teaching tools.

Intellectual output

The intellectual output is integrated on:

www.ditmep.eu

Conclusions

Innovation

Vocational training

Professional

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1 PROJECT GOALS

DITMEP project aims to improve manufacturing learning, in particular Risk Prevention courses, generating digital capabilities on the methodology (through e-learning, gamification and augmented reality experiences) for educators and trainees. This will support and help the transformation of manufacturing training.

In particular, **DITMEP** will focus on composites manufacturing, a key area with application in different sectors: building, automotive, transport, electronics, leisure, wind energy, etc. Carbon fiber composite materials have been increasingly substituting metal components from growing concerns regarding fuel consumption and CO2 emission levels. Germany is the largest EU country in the GRP/composites market with a total production volume of 225,000 tonnes. Despite the drop during the economic and financial crisis, Italy, Spain and Portugal keep an important level of production volume of nearly 160,000 tonnes stabilised since 2012. Market growth in Eastern European countries has been remarkable in recent years, reaching a production volume of 217,000 tonnes (Witten & Mathes 2019).

There is a lack of specific training centers for composites manufacturing, although some examples have recently appeared. CETMAR manages A Aixola, a reference center in Spain in this sector, focused on resin transfer mould manufacturing. Within A Aixola courses, Risk Prevention is critical for a high-quality and effective training that guarantee security at the factory-environment that presents different risks due chemicals, machinery, working loads, etc. which must be known and considered for a safe workplace.

The aim of the **DITMEP** is to develop these blended courses for Risk Prevention with digital capabilities, in a transnational format solution for an innovative and reinforced education on composites manufacturing, which can be easily replicated at other sectors. We will address an e-learning platform, through training contents gamification, and complete it with AR experiences through a mobile app. The practical view of these courses are critical; for accomplishing this, **DITMEP** proposes to embed interactive techniques such as gamification and AR to deliver learning experiences that are close to in-person workshop traditional training.

2 THE PROJECT

DITMEP is organized as a training course with a detailed lay-out where the contents and the different gamification methods and digital tools will be integrated. The initial structure is then based on the experience of the partners.

The project is organized in 6 work packages, 2 are addressed to the contents elaboration and digitalization, 1 to refine the course structure and validate the outcomes and the other 3 to management, dissemination and quality control.

The means of this project are based on the experience not only of the partners but also of the vocational training centers where the pilot tests have been carried out. The main

innovation of the project is related to the development of an application for mobile devices using augmented reality.

3 INTELLECTUAL OUTPUT

In the field of occupational safety training, the project has developed a modular training course on the Moodle platform, which consists of 2 blocks with a total of 8 units:

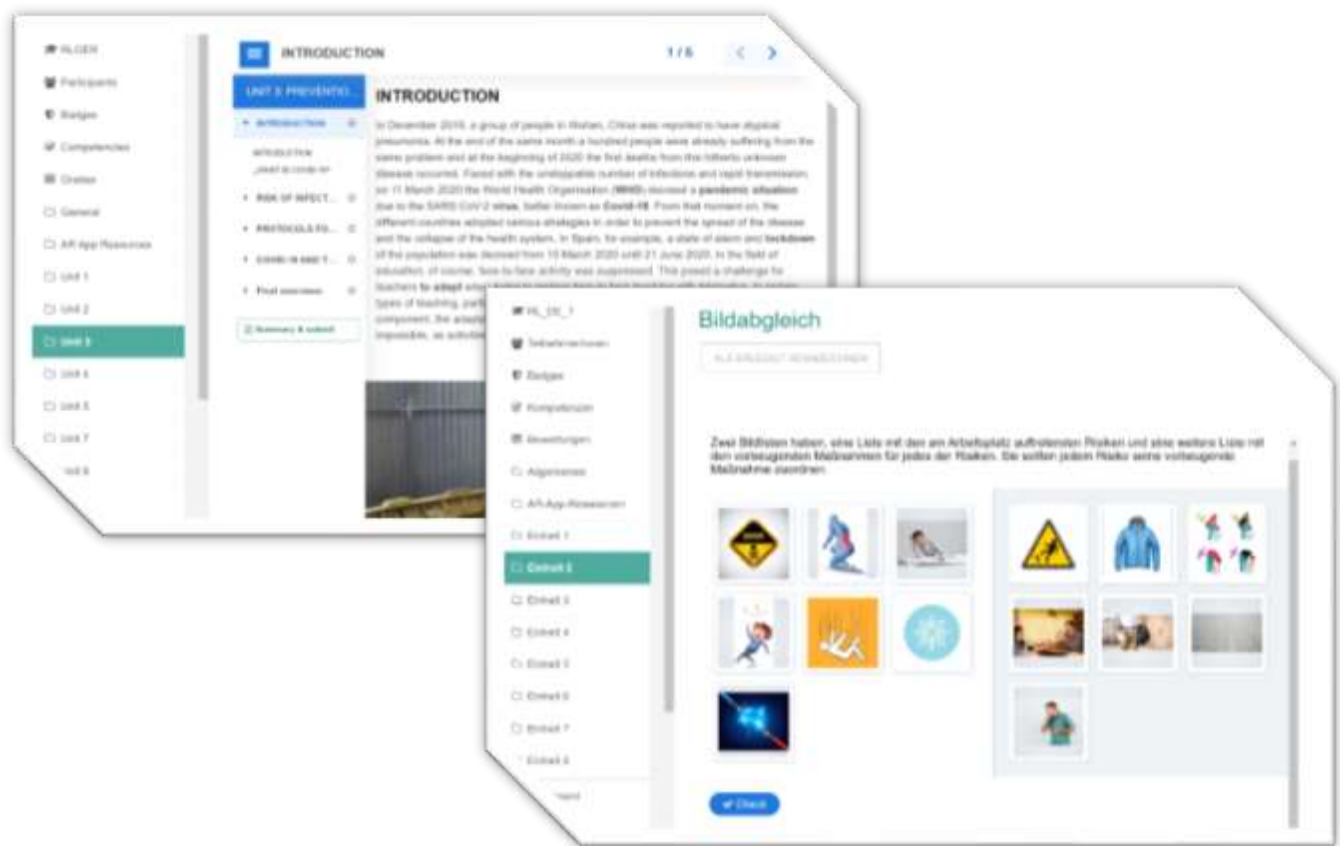
Block 1: General risks

- Unit 1: Basic concepts on safety and health
- Unit 2: General risks and their prevention
- Unit 3: Prevention and safety against COVID 19

Block 2: Specific risks in composite manufacturing

- Unit 4: Risks associated with workplaces and work surfaces
- Unit 5: Risks associated with work equipment
- Unit 6: Risks linked to the use of chemical products
- Unit 7: Personal protection elements (PPE) and safety clothing
- Unit 8: Signposting a polyester workshop

The full training course is available in English, Spanish, German and Portuguese. The theoretical content can be studied directly on the Moodle platform or downloaded to local storage. The theoretical content on the Moodle platform is kept interactive, so that questions can be answered while reading.



In addition to the theoretical content, there are various games and/or questions for each module, which can be used to test and deepen what has been learned.

An augmented reality app was developed for units 7 and 8, which is available on Google PlayStore. In the "Personal Protective Equipment" area, the students have to choose the correct protective equipment in a fiber composite workshop, which must be worn in a specific area (e.g. in the warehouse or in the mixing area).



In the "Signage" section, select the appropriate signs that must be displayed at the entrance to a specific area.

In both scenarios, the app includes detailed explanations of all choices, so students can also learn the different pieces of personal protective equipment and the different signs through the app.

Both the entire online course on the Moodle platform and the augmented reality app are available in English, German, Spanish and Portuguese.

4 PROJECT CONSORTIUM

Universities and training centres from three countries come together, to improve manufacturing learning, in particular Risk Prevention courses, generating digital capabilities on the methodology (through e-learning, gamification and augmented reality experiences) for educators and trainees.



5 PILOT TESTS

After completion of the online learning platform and the augmented reality app, these were tested by some project partners as part of so-called pilot tests:

- CETMAR carried out the pilot test with students from the Axiola Training Center.



- RSC conducted the pilot test with 12 people from the field of renewable energy sector.



- ISQ carried out the pilot test with trainers, who integrated DITMEP course in their courses.



6 PROJECT CONCLUSIONS

The experience of developing the project allowed to draw several conclusions:

- Since the individual project partners offer training at different levels, it was not easy to find a common learning level
- The start of the project during the corona pandemic, which made face-to-face meetings impossible in the first six months, led to certain teething problems
- The pilot experiences with the various project partners have shown that the training course has aroused great interest

In this sense, the possibility of continuing the work carried out both with the partners' own funds and with possible public support is considered. In this sense, the strategic approach for the future is based on the following points:

- Tracking the impact of using the DITMEP training course and AR app
- Possible expansion and adaptation of the AR app for other areas in which the topics of "personal protective equipment" and "signage" play a central role
- Assess the possible update of tools to track hardware and software progress in AR.

DITMEP

The AR for Android 12 or higher



The AR for Android 11 or lower



The entire online training course is available from the following link:

<https://nextcloud.citius.usc.es/s/SJwBENKMt6o9YNp?path=%2FMOODLE>



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