



USING AUGMENTED AND VIRTUAL REALITY IN TVET

Paint VR

Submitted by SBG Dresden, Germany
and Confederatie Bouw, Belgium

BIBB International Roadshow DIGITAL MEDIA IN TVET



Abstract

The Paint VR application is implemented in the work-based learning of trainees in the painting trade. Before practical training, trainees learn how to prepare an underground and how to paint a wall. The VR application helps learners to enhance their practical know-how and train specific techniques and motion sequences before carrying out the respective works in the real world.

The careful planning of the necessary technical setup ensured that the Paint VR application is an easy-to-use solution to support vocational training and career education in the painting trade.



Basic Information

- **Purpose of immersive technology use in TVET:**
 - Motor skills training
 - Acquisition of professional competencies
- **Sector / subject area:** Painting trade
- **Type of training:** Formal training in the context of initial and continuing vocational and professional education
- **Start date:** 2018 **End date:** 2021
- **Partners:**
 - SCP SERV (CY) - VR Development,
 - Confederatie Bouw (BE)
 - SBG Dresden (DE) – Coordinator DIGI4VET project.
- **Funding programme:** Erasmus Plus

Educational Concept

Learning contents & outcomes

The Paint VR application offers learners to **exercise specific tasks** and **acquire professional competencies** during the early phase of vocational training before carrying out painting works in the real world.

Trainees in the painting trade learn how to prepare an underground (e. g. a wall) by using differently sized spatulas and how to paint a wall, using various tools and techniques.

The design of the VR learning scenarios familiarizes learners with all **relevant work steps**, starting with the analysis of the task at hand (problem identification) that is followed by the preparation and execution of relevant work steps.

Virtual training helps to achieve the following **learning goals**:

- Enhance learners' practical know-how for carrying out painting works
- Train specific techniques and motion sequences

The VR application is **part of the modernized TVET (2021) curriculum** in selected schools for painting trade in Belgium.

Educational setting

The application has been implemented in the formal TVET system as part of **work-based learning**

- The **target group** are trainees in the painting trade.
- The application is used **individually**. **Learning stations** were introduced in order to organize the use of the VR application in practice.
- The application implements an **experiential task-based learning approach**: Learners carry out specific tasks in the virtual environment and execute relevant work steps for the preparation and painting of a physical wall.
- **Teachers / trainers assist** trainees by explaining the use of the VR application and **provide verbal guidance** during use. They are also responsible to **evaluate** trainees' work performance.

Technical Setup

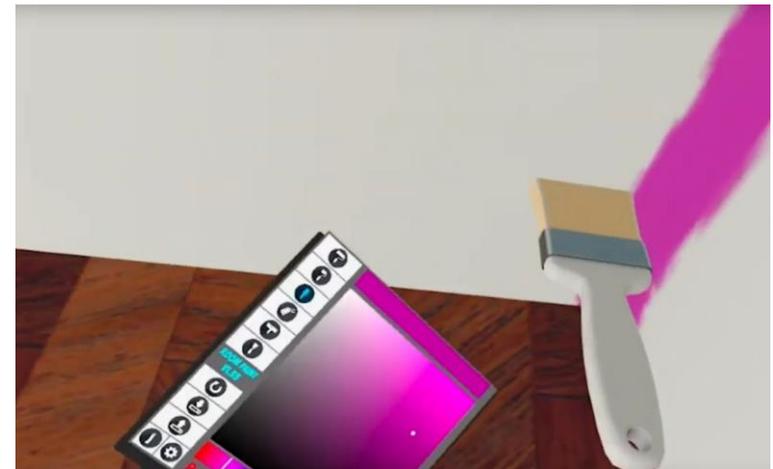
Hardware

The hardware necessary to use this VR application consists of

- Standalone headset (Oculus Quest 1 and controllers)
- External screen (for guidance provided by instructors)

Motion Tracking

- To allow users to walk freely within the defined virtual training area, a **standalone headset** was chosen for the VR application
- The Oculus Quest 1 headset features 6 Degrees of Freedom, which means that **all translational as well as rotational motions of the user can be tracked** by the integrated sensors.
- The user interacts with the virtual environment via controllers. He/she can choose **various virtual painting tools**, such as differently sized spatulas, rollers, paint brushes and an extensive RGB color palette.



Benefits of Use in TVET

The virtual simulation for the painting trades supports practical training

Offering practical training in a virtual environment provides a tailor-made and easy to use solution for TVET in painting trade. The VR application is particularly well suited to enhance trainees' understanding of work tasks in the painting trade. It can be used at the early stage of apprenticeships or for providing career education.

VR-based training facilitates the effective achievement of learning outcomes

As the use of a standalone headset enables users to move freely within the defined space, they can independently exercise work tasks, and train specific techniques and motion sequences that are part of the TVET curriculum.

Lessons Learned

Involvement of practitioners is essential

The collaboration of programmers with painters and teachers/trainers during the planning phase is crucial to ensure the practical benefit of immersive technologies for TVET. In particular, the development of virtual learning scenarios should be aligned with the respective TVET curriculum. Furthermore, it must be ensured that the work tasks are suited for virtual training and that instructions e. g. on work tasks are visualized in a clear and simple way to create a benefit for learners.

The educational design matters more than technology

The careful planning of the technical set-up facilitates the achievement of learning outcomes (e.g. use of standalone devices to ensure free movement). Nonetheless, particular attention must be paid to the educational concept, as the quality of the teaching approach is decisive for the success of virtual training. Evaluation of the application should take place before, during and after implementation in TVET to determine the educational impact.



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The Bridging Innovation and Learning in TVET (BILT) project provides TVET stakeholders with a platform for exchange and supports them to address current challenges in TVET systems, which arise due to technological, social, environmental, and workplace changes. Within BILT, the overarching theme is New Qualifications and Competencies in TVET, which is supported by four focus themes in the context of TVET:

- Digitalization
- Greening
- Entrepreneurship
- Migration

Through regular knowledge exchange, thematic project activities, and expert working groups BILT leverages the existing mechanism of the UNEVOC Network to offer opportunities for collaboration and peer learning in

Europe, Africa, and Asia and the Pacific. The project complements national developments to explore and support innovative, market-oriented and attractive modes of learning and cooperation in TVET.

The results of ongoing activities are accessible on BILT's web page.

The BILT project is carried out in collaboration with UNEVOC Network members, coordinated by UNESCO-UNEVOC with support of the German Federal Institute for Vocational Education and Training (BIBB), and sponsored by the German Federal Ministry of Education and Research (BMBF).

For more information, please visit

www.unevoc.unesco.org/bilt

or contact us at unevoc.bilt@unesco.org

BIBB International Roadshow Digital Media in TVET

Initiated by the Federal Institute for Vocational Education and Training in Germany (BIBB), the Roadshow aims to show the potential of digital applications and technologies for teaching and learning in Technical Vocational Education and Training to make learning more flexible and enhance the quality and attractiveness of TVET.

The format builds on the German Roadshow 'Digital Media in TVET', which has been successfully implemented and conducted by the Federal Ministry of Education and Research in Germany (BMBF) in cooperation with BIBB since 2016.

More information:

<https://www.bibb.de/en/147504.php>



About SBG Dresden

SBG Dresden is an inter-company training center for the chemical and pharmaceutical industry. The non-for-profit organization focuses on the provision of initial and continuing vocational education and training in the fields of chemistry/pharmacy and painting trade. In relation to the German dual VET system, the center provides practical training additional to that received at work, as opposed to the more theoretical off-job component which is provided by a vocational school. The aim is to provide relevant practical know-how (“Handlungswissen”) along with critical thinking skills relevant to practical tasks.

As coordinator and partner in transnational projects, SBG Dresden develops, tests and evaluates modern technologies like Augmented and Virtual Reality for vocational training practice.

Contact & Further References

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Further references

- Demo video 1:
[Preparing of an underground in VR](#)
- Demo video 2:
[Painting of walls in VR](#)
- Website SBG Dresden:
<https://www.sbg-dresden.de/aktuelles/projekte/digi4vet>

