



USING AUGMENTED AND VIRTUAL REALITY IN TVET

SIMSPRAY – VR Training System for Spray Painting in Morocco

Submitted by MIMBUS, France

BIBB International Roadshow DIGITAL MEDIA IN TVET



Abstract

SIMSPRAY is a virtual spray paint learning system that helps students to acquire technical skills and train fundamental motor skills required for performing car or industrial painting and blasting works. The VR training solution speeds up the initial learning steps of students and improves the quality of professionals' performance.

The use of SIMSPRAY in vocational training is supplemented by VULCAN, a learning tracking platform that supports instructors in tracking and evaluating the learning progress of students and create customized exercises.

The deployment of the VR training solution SIMSPRAY in Morocco was realized in collaboration with the national Office of Vocational Training and Employment (OFPPT).



Basic Information

- **Purpose of immersive technology use in TVET:**
 - Motor skills training
 - Provide support with assistance systems
 - Use authoring tools to create learning content
- **Sector:** Paint and coatings industry
- **Course / subject area:** Car and industrial painting
- **Type of training:** Post-secondary and adults training
- **Partners:** Office of Vocational Training and Employment Promotion (OFPPT), Morocco
- **Start date:** 2020 (ongoing)

Educational Concept

Learning contents & outcomes

SIMSPRAY by MIMBUS offers progressive training for learners to acquire and improve **professional competencies and manual dexterity** required in the area of car and industrial painting.

The VR training solution helps to achieve the following **learning goals**:

- Enhance understanding of industrial paint applications;
- Train and improve students' concentration, body position and hand motions required for spray painting;
- Speed up the learning process through performance analysis and feedback

OFPPT integrated the VR-based training in their curriculum. After an initial pilot phase, the VR training solution will be deployed to all OFPPT campuses by early 2022.

Educational setting

The VR training solution is designed for learners to **train repetitively** on SIMSPRAY:

- The learning approach combines experiential learning, blended learning and gamification elements: SIMSPRAY is used during the **initial learning period** and then used regularly to further improve learners' motor skills during **practical sessions** in school. VR training can also be combined with and/or precede **in-company training** to prepare learners for the workplace.
- The **target group** of this project are TVET students at post-secondary level or unemployed people who attend training courses at OFPPT to become professionals in the paint and coating industry.
- VR training is usually organized as **individual training**, but can also take place in a group.
- **Trainers** use VULCAN as **virtual assistant** to keep track of individual learning, provide feedback and create exercises that are aligned to learners' skills development and the respective curriculum.

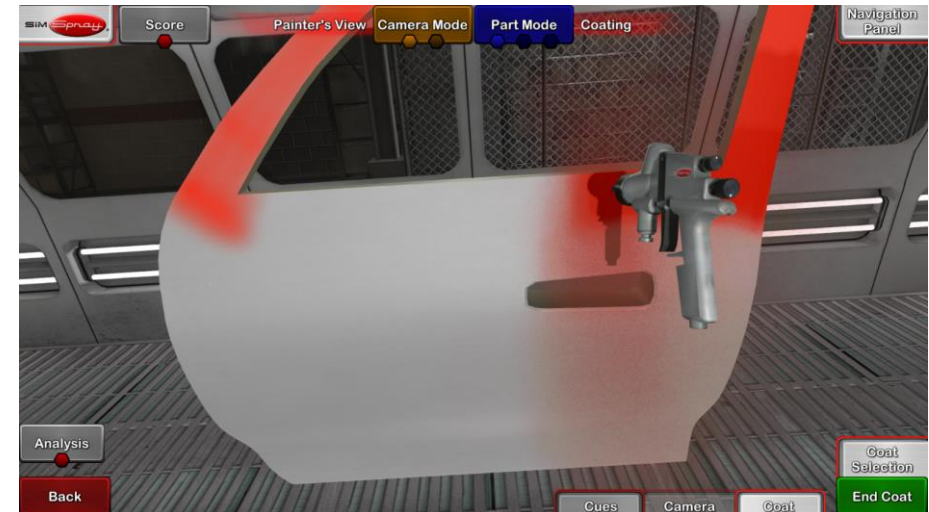
Technical Setup

Hardware

- Computer
- External tracking system
- Head-mounted display (HTC Vive Pro)
- Painting guns and accessories

Motion tracking

- **Room-scale VR** allows users to move around the objects displayed in the virtual space
- The **painting gun** can be set-up the same way as in real life. Painting quality such as the quantity of pain used and wasted, defects in the applied paint as well as motion speed and orientation (e.g. angle, distance) are closely **tracked**.
- SIMSPRAY also has also offers various **assistant tools** such as guides, information and visual feedbacks to support learners' training.



Benefits of Use in TVET

Reduction in training costs and waste

While learners can spend more time for practical training, training costs can be significantly reduced by saving painting material. This also reduces the impact of training on the environment.

VR-based training of motor skills increases training efficiency

Integrated performance analysis and feedback speeds up the learning process and significantly reduces training duration as the VR applications allows learners to repeat exercises numerous times at no extra costs. The efficiency of SIMSPRAY has been validated worldwide by various customers.

Performance tracking supports achievement of learning goals

Thanks to VULCAN, each student's learning progress is tracked and trainers can ensure that they advance accordingly. Trainers can adapt the curriculum for each student to make sure the group is making progress, and no one is left behind. The data provided by VULCAN aligns with the necessary data to validate the final achievements.

Lessons Learned

Design of XR solutions must support competency development

Immersive training solutions should not be just a virtual copy of reality. Rather, they should be designed in such a way that they support competency development and therefore may differ widely from the "real experience". For this purpose, it is crucial to include pedagogical staff and experienced practitioners in the development process.

Flexible adaptation of virtual training content is essential

To ensure the benefits of VR-based training, it is essential to align virtual training with local standards. Integrated training management systems such as VULCAN allow instructors to flexibly adapt exercises and modify learning paths in alignment with local curricula and learners' needs.

Provide targeted support to instructors

Teachers and trainers are essential for ensuring the acceptance and successful integration of immersive technologies in TVET. The MIMBUS ACADEMY was founded to provide guidance and training for instructors to implement technology-enhanced learning approaches into their practice.



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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

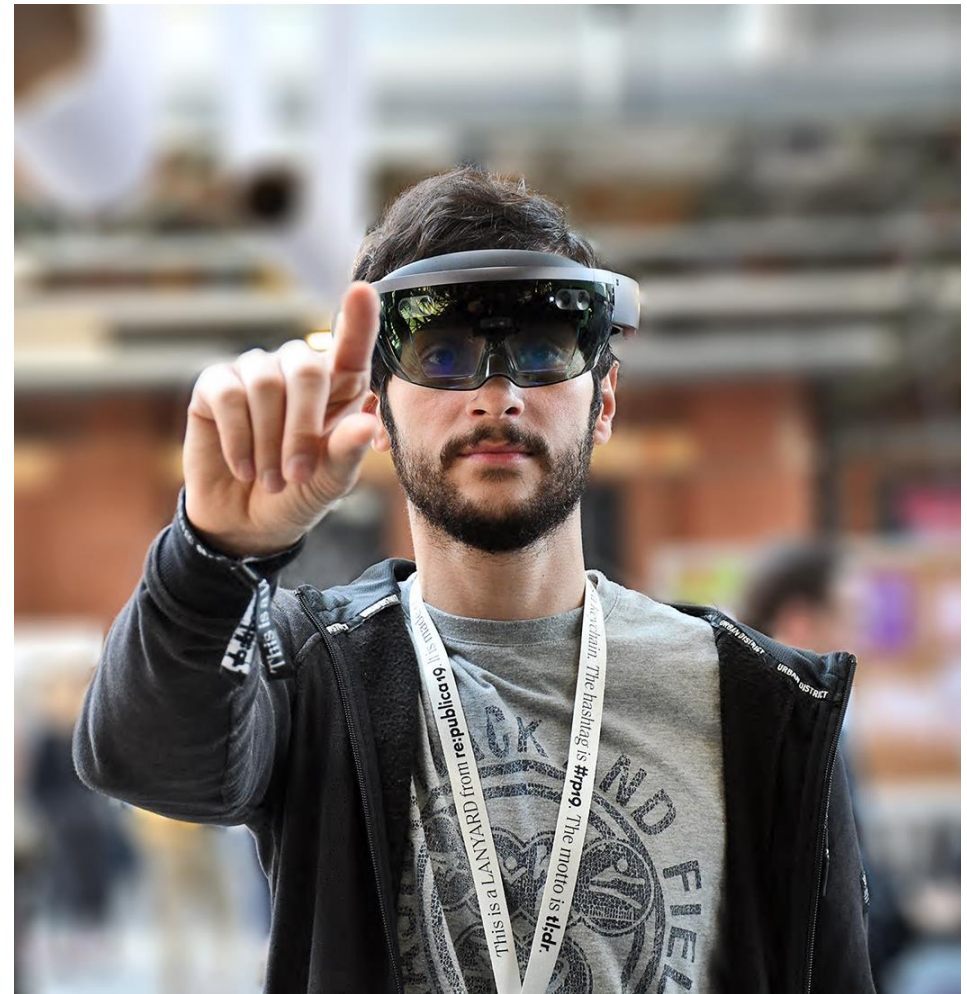
BIBB International Roadshow Digital Media in TVET

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 MIMBUS

MIMBUS creates and distributes immersive training solutions for TVET. Focused on manual training skills, our catalogue covers more than 20 different developments.

We created VULCAN, a Cloud Tracking System for the instructor to evaluate and control each student progress. We also provide trainer's training to enable them to use XR learning solution through MIMBUS ACADEMY. MIMBUS is present in 50 countries in the world with more than 4000 TVET institutions equipped.

Contact & Further References

Contact

- Dr Laurent Da Dalto
CEO & Founder
MIMBUS
laurent.dadalto@mimbus.com

Further references

- SIMSPRAY Demo video:
<https://www.youtube.com/watch?v=JbVdKNkxgMM>
- VULCAN Demo video:
<https://www.youtube.com/watch?v=Ent3HqJ4C2c>
- Website MIMBUS:
<https://www.mimbus.com>

