Virtual reality in apprenticeship training: myths and real possibilities

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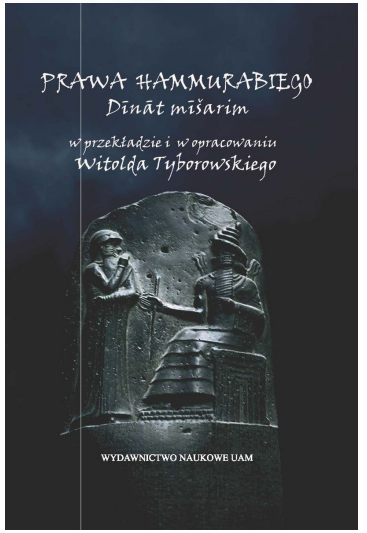
part 1: Tradition and qualities of apprenticeships

Learning by doing (Dewey)

Shaping citizen's competencies (Kerschensteiner)

Tradition of master-apprentice relation

- Over 40 centuries of master-apprentice relationship in craftsmanship
- *Dinat mišarim* by Hammurabi, craft masters were called: *Mār ummiānum*
- **Statistics for apprenticeships in Europe and other continents (renaissance of the systems)**
- **Role of employers and their organisations (mainly chambers)**
- **Systemic anchor in the EQF and NQFs**
- **Qualities of apprenticeship systems**
- **Master's / Instructor's competencies* and personality as a guarantor of the apprenticeships sustainability and adaptability**



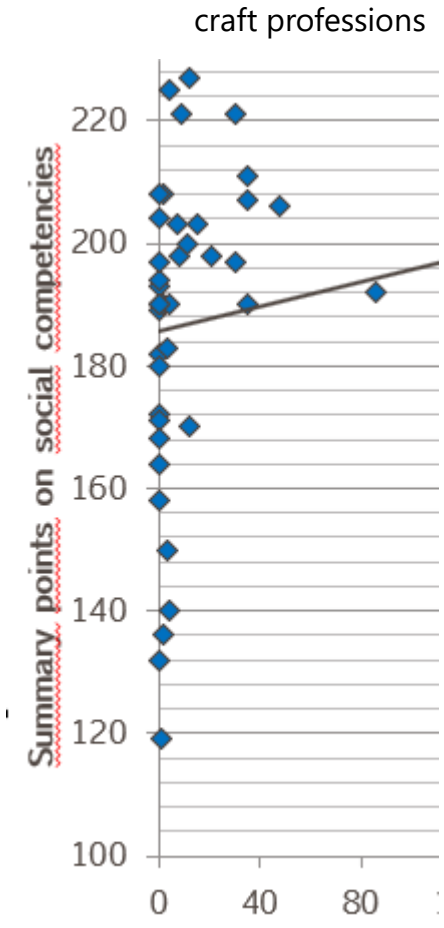
*Competencies understood as a set of instrumental and directional features

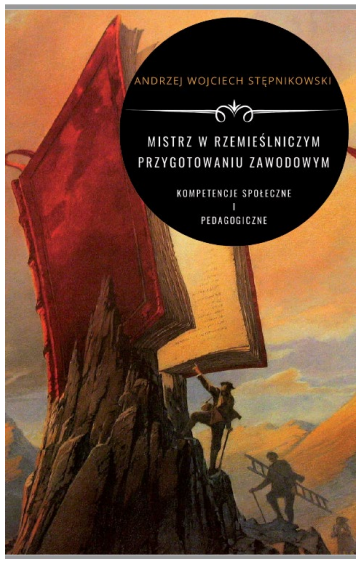
Craftmaster-teacher's personality make system resilient

- **Personality is formed in social experience (and allows you to share your own experience)**
- **Since personality traits are an element of competence (and personality can be developed), competences can also be improved through social training**
- **Pedagogical work is social training**
- **Further training and professional development processes are part of the personality development program – because development lasts a lifetime, and its expression is the pursuit of professional mastery.**

POSITIVE correlation: Spearman's Rho rs=0.5 (moderate) and significant (α=0.01) in unpopular professions

Figure 1. Positive correlation between training of apprentices and craftmaster's social competencies





The main functions of learning

The main function of learning and training is CHANGE. It's about shaping the willingness and ability to do something we want or need to do. It's about being competent, which means having the right competencies (related to knowledge and skills and attitudes).

Personality is a fundamental tool for the correct implementation of the goals and tasks of the teacher-educator

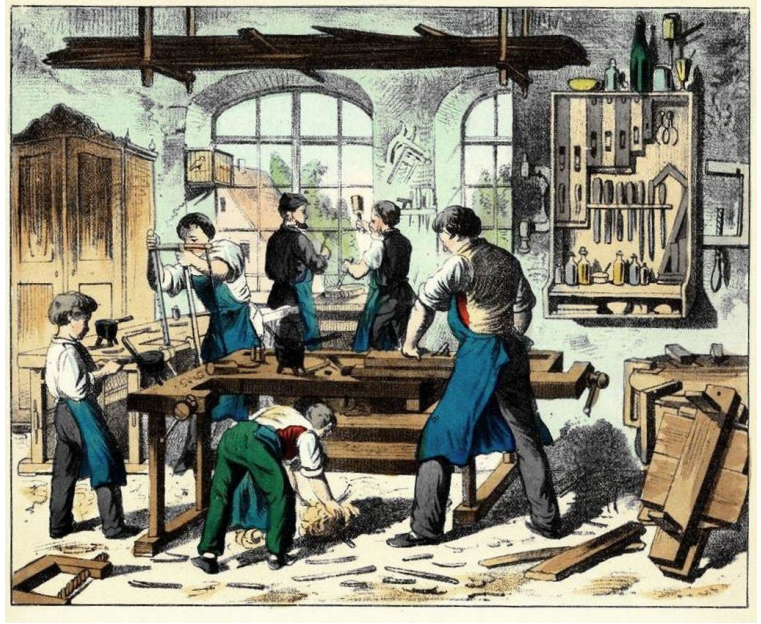
The personality of the educator – allows you to have authority and be an authority.

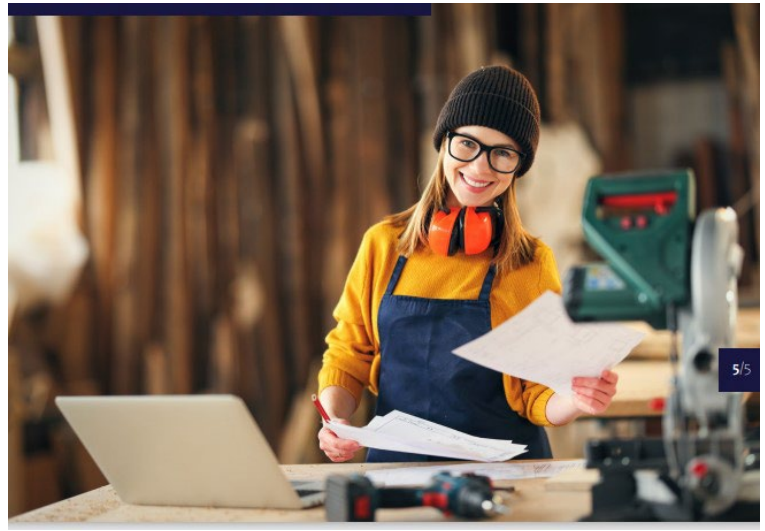
However in order to maintain authority nowadays you need to be also well acquinted with new technologies, including ICT.

What makes apprenticeship resilient?

1) **VET Teacher-educator-master competencies**
2) **Synergies with employers and their ecosystems (guilds, chambers, associations) enabling teaching with the use of modern equipment and technologies**
3) **World-wide recognition of qualifications legalisation/apostile basing on strong tradition (there is a one role model of craftmaster, journeman, etc.) and Hague convention from 5.10.1961, Europass and other**
4) **Shaping an aware citizen (G. Kerschensteiner) with professional and social competencies**
5) **Professional skills are acquired in most effective way of learning by doing (J. Dewey)**

In the decade 2010-2020 apprenticeships were re-introduced in many countries around the World. All went quite well **however...**





part 2: Wild card – COViD-19

COViD-19 challanges for VET

The COVID-19 pandemic has presented unique challenges to all types and levels of learning including vocational education and training (VET). An entire generation of VET learners could suffer severe disruption of their learning if continuity of distance learning is not ensured.

[english_-_digital_gap_during_covid-19_for_vet_learners_at_risk_in_europe.pdf (europa.eu)]

TV lessons

On-line lessons

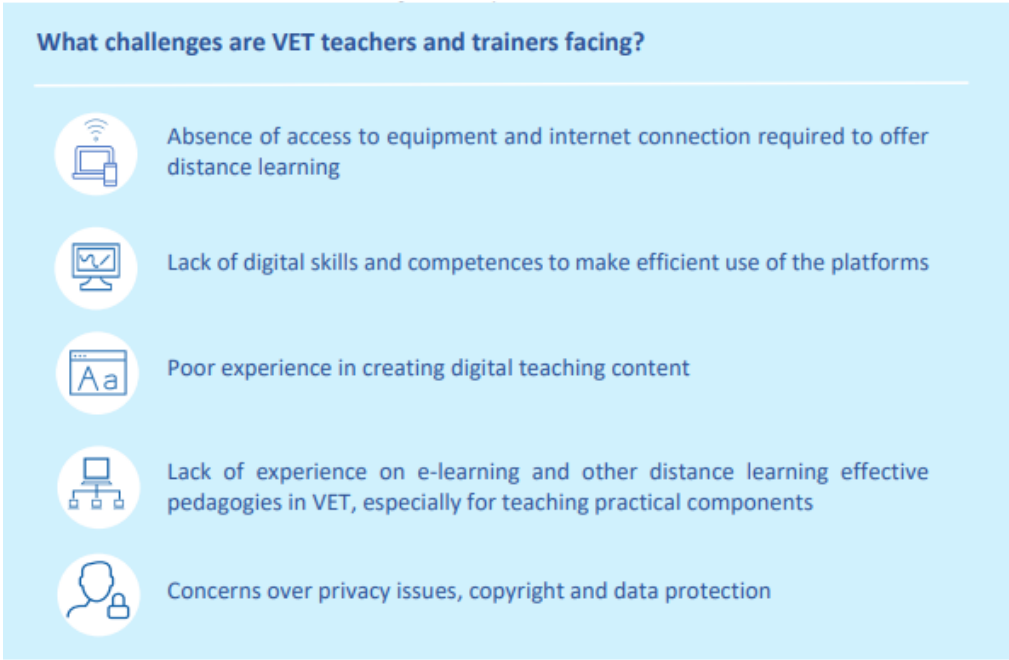
Frustration and lack of engagement

Digital gap for apprenticeships

1) **Disturbed contact between teachers/craftmasters and students/apprentices**

2) for few months in Poland but also in other countries there were difficulties with trainings in companies and with vocational exams

3) teaching and training forms and methods were not attractive in the first period, teachers were trying to master ICT apps, however many teachers and masters were surprised with this challange (in Poland in 2020, only 62% of craftmasters were using ICT solutions in the apprenticeships - in many cases it was use of simple programmes)



Source: *Cedefop*.

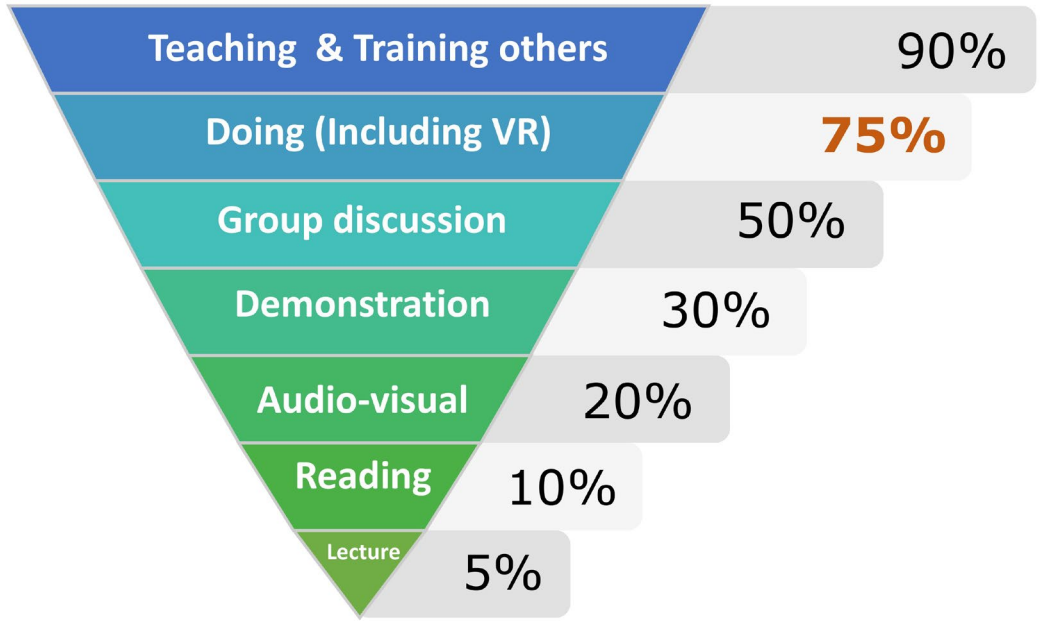
VR as an answer?

Virtual Reality (VR) has opened new possibilities for communication and new ways of education, including new approach towards Vocational Education and Trainings (VET) and for teachers.

VR and Augmented Reality (AR) can make education more immersive and engaging **to be remembered in very attractive sing content way**. Virtual Reality Learning Environment (VLE) should however include also some space for effective interaction and cooperation. That requires from participants some at least elementary rules of communication in VLE.

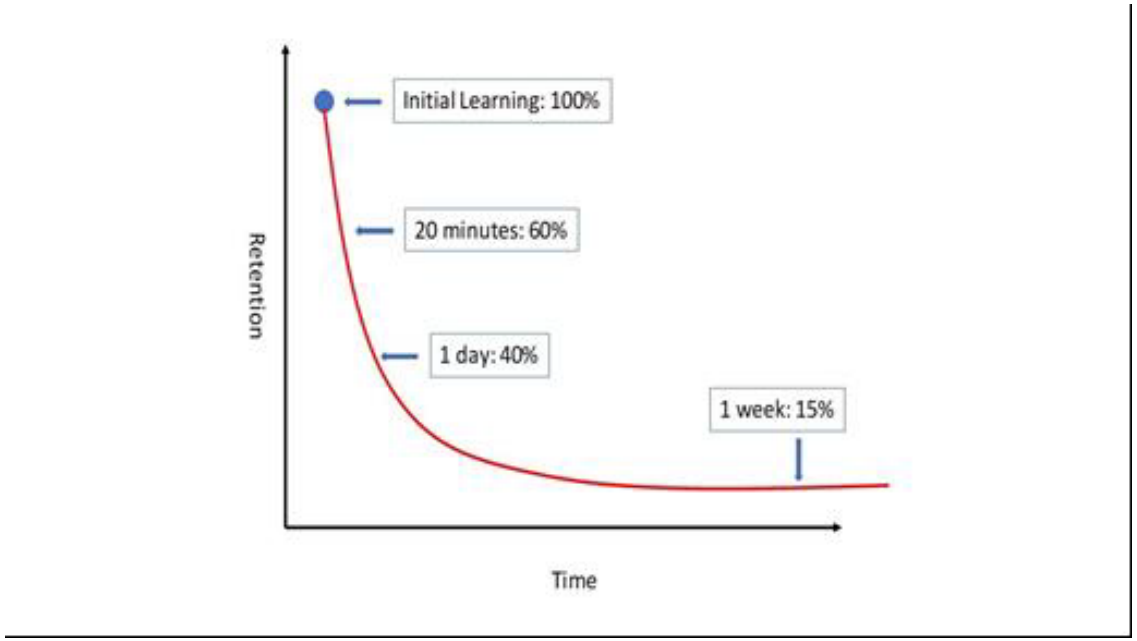
With topping 9.36 million shipments in 2021 VR headset shipments reached over 13.59 million worldwide in 2022

Figure 2. Dale's Cone of experience and learning retention



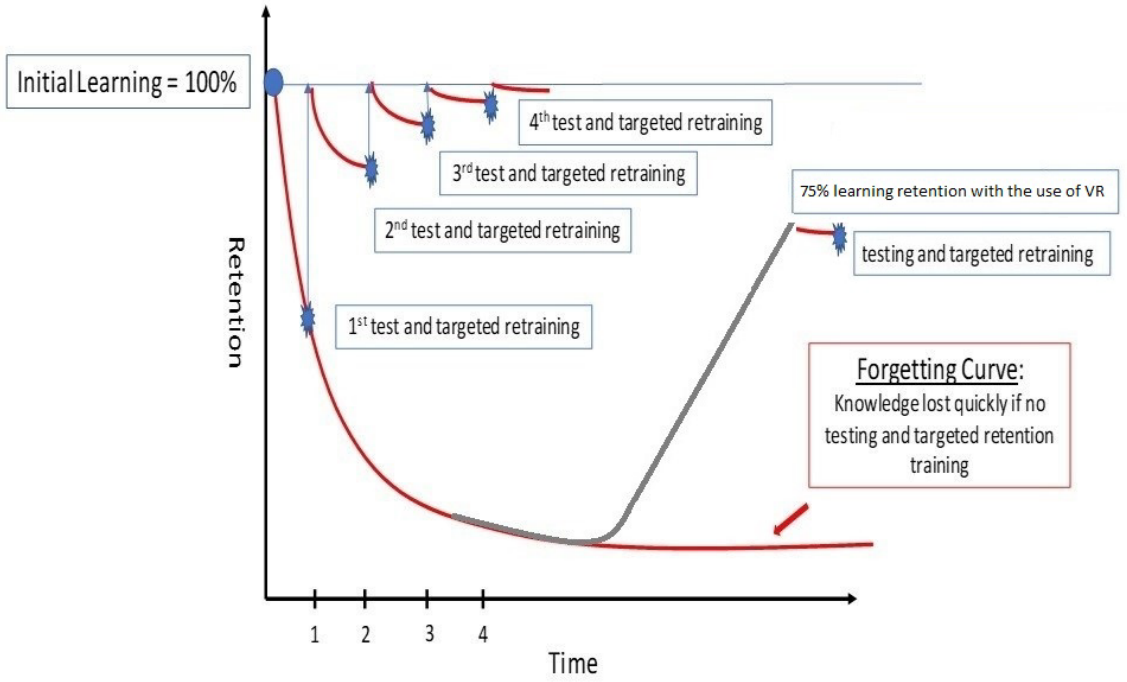
Source: https://frontcore.com

Figure 3. Hermann Ebbinghause's forgetting curve



VR learning environments thanks to flexibility (you can wear them wherever and whenever you want) and attractivity (nice visualisation with elements of interaction and gamification) are friendly to use practically everyday.
Thanks to that you can practice (learning by doing) in **safe** environment (you will not break the machine for example) and without additional costs.

Figure 4. Learning retention and teaching/training



Source: own elaboration from Maddox T. 2017.

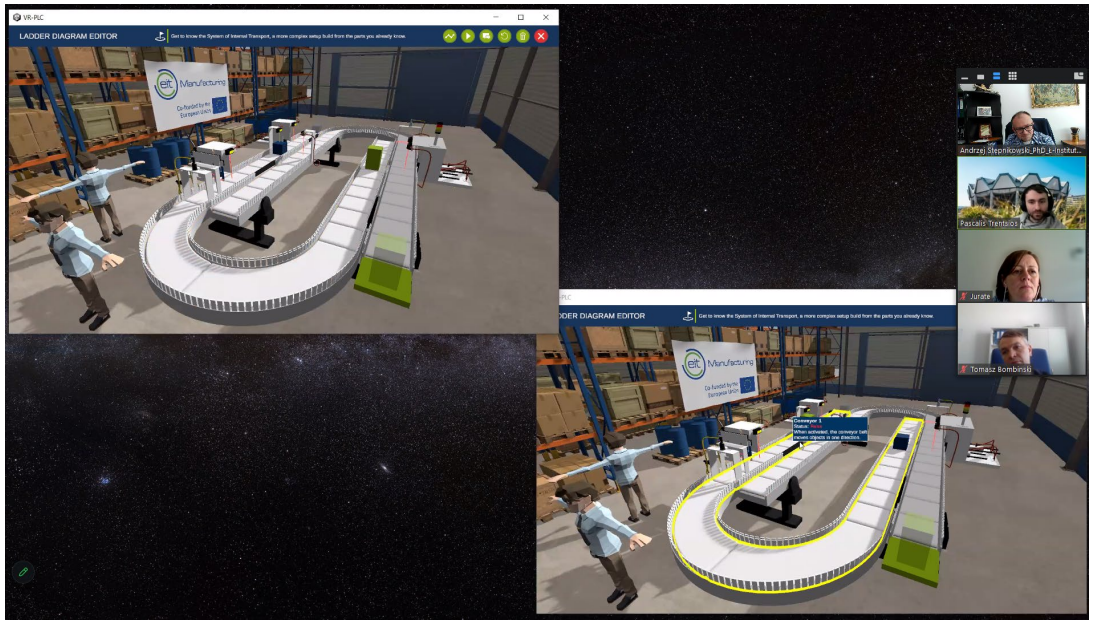
Due to that **you are able to train and re-train yourself frequently and that is preventing you from forgetting** (that improve your learning retency).

It is even easier to achieve if you have a tutor or guide to support you.

Such solutions are attractive form for enriching stationary or on-line courses (are open for many worlds and possibilities)

"The brain is hardwired to forget" (T. Maddox, University of Texas)

Tests and targeted retraining sessions stimulate, long-term memory storage enabling us to keep acquired information and even recall them *(with some techniques such as activation of pre-knowledge for example).* ***Tests and retraining should be repeated a few*** *(even three or four) times so that "less and less information must be retrained, and forgetting is nearly absent"* (Maddox T. 2017).



COViR

Part 3a: good practices for VET

COVIR Project Collaborative Virtual Reality platform for e-learning: Teaching Communication (ERASMUS+, 2020-1-PL01-KA226-VET-095931)

Co-funded by the Erasmus+ Programme of the European Union

About COViR project

1) Develeopment of the e-learning course on the VR (history, equipment and functionalities)
2) Development of the communication skills course for the use of VR learning environment
3) Developing the VR Platform
4) Certification in VR environment
5) COViR Teachers Guidebook

Erasmus+

COViR Teachers' Guide

This document contains Teacher Training Materials from the COViR Project co-funded by the European Union under the Erasmus+ programme

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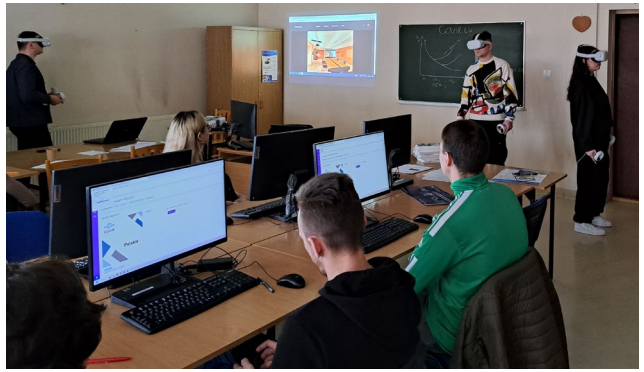
COViR

Co-funded by the Erasmus+ Programme of the European Union

Project results in short

- Within 24 months we managed to train 16 Meta VR Trainers with pedagogical qualifications (8 in Poland, 6 in Cyprus, 2 in Greece and 2 in Spain).
- They have trained 16 trainees (8 in Poland, 4 in Spain, 3 in Cyprus, 3 in Greece)
- We held 6 multiplier events for about 100 people (48 in Poland)



COViR

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Instytut Technologii Eksploatacji

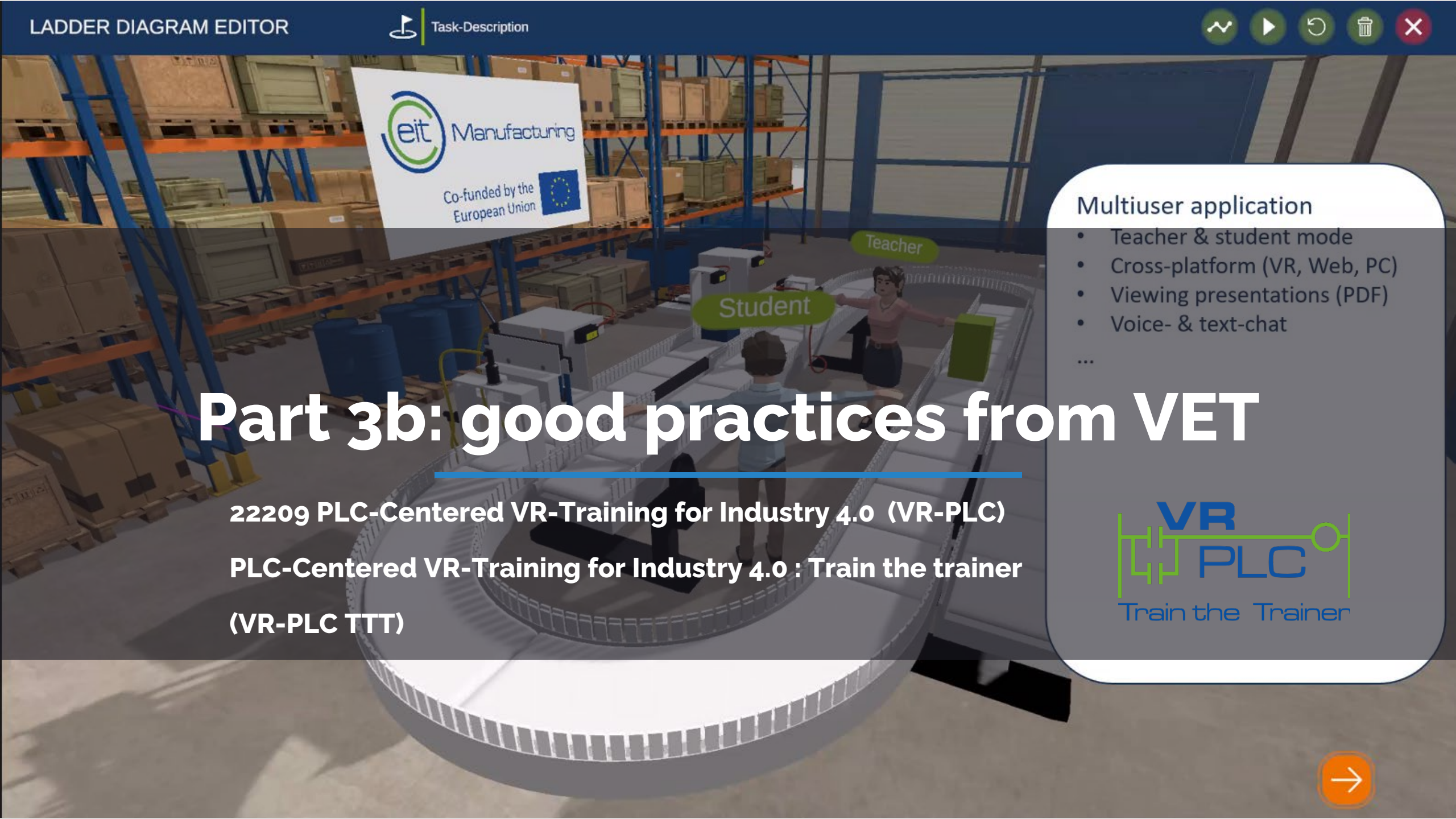
EdITC EDUCATION & INFORMATION TECHNOLOGY CENTRE

MMC Mediterranean Management Centre

ΕΣΕΕ

SENSEWORKS
everyday technologies

FUNDACIÓN equipo humano



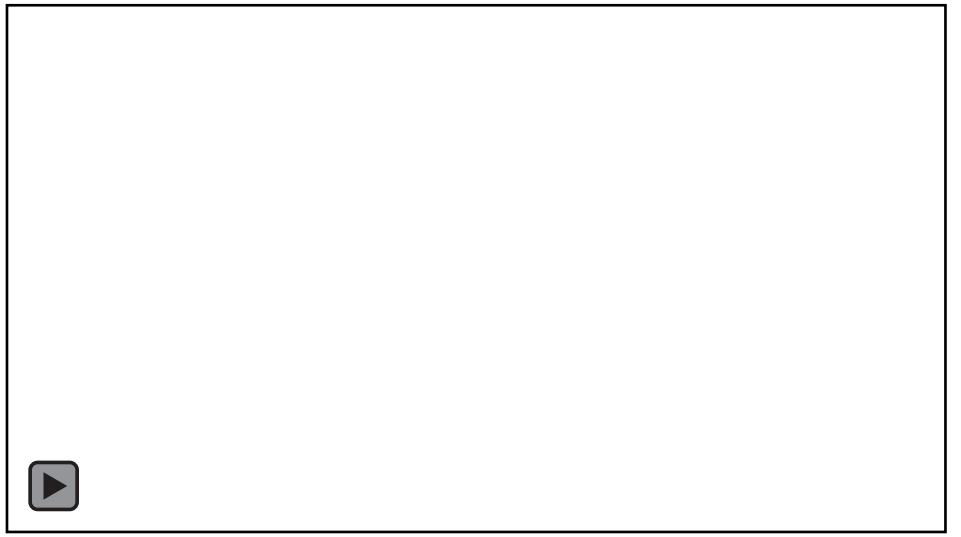
Part 3b: good practices from VET

22209 PLC-Centered VR-Training for Industry 4.0 (VR-PLC)

PLC-Centered VR-Training for Industry 4.0 : Train the trainer (VR-PLC TTT)

About VR-PLC and VR-PLC TTT projects

1) Training needs analysis in Radom Metal Cluster and LINPRA
2) Development of the content for learning nuggets for the SkillsMove.eu Platform (EIT-M)
3) Developing the VR-PLC Platform
4) Testing and workshops in Radom (Poland) and in Kaunas (Lithuania)
5) Development of another project: VR-PLC Train the Trainer (new range of possiblities for interaction)



VR PLC Train the Trainer

eit Manufacturing

Co-funded by the European Union

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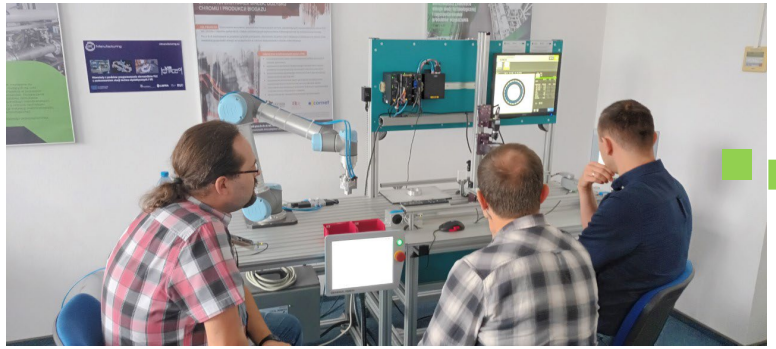
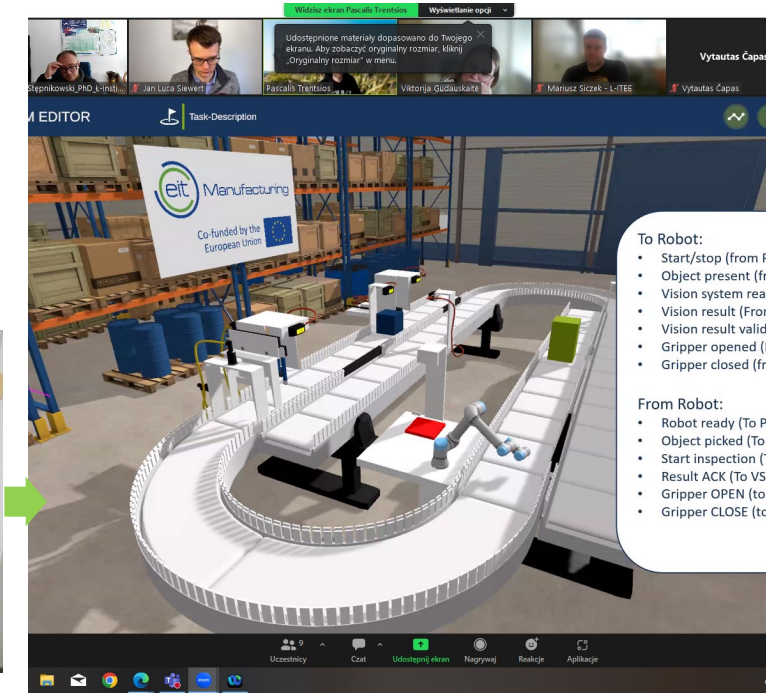
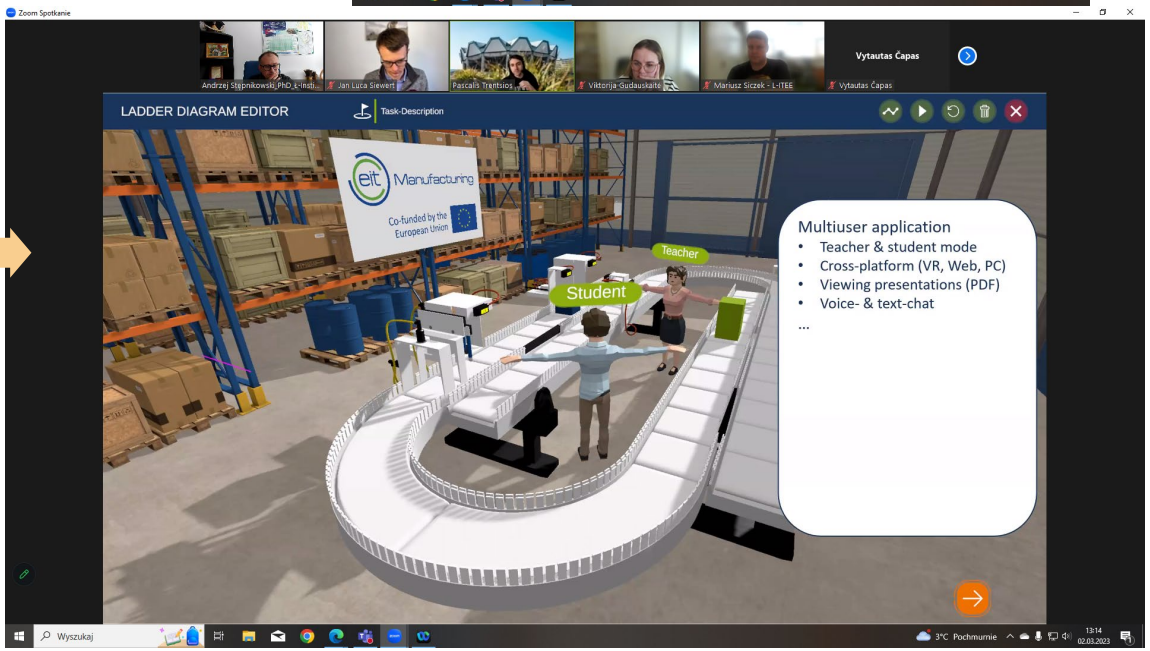
VR-PLC Train the Trainer

- Within 18 months we managed to develop 8 learning paths with over 30 learning nuggets that were consumed by 25 learners so far
- We have organized 4 workshops (3 in Poland and 1 in Lithuania) for about 50 employees, VET teachers and students
- Now we are developing upgraded VR learning environment for visual inspection robot and interactions with VET instructor







Part 4: VR learning environments and solutions (in the context of apprenticeships)

Main myths on VR

- It is not an Augumented Reality (AR)
- You can (not) use them without any limitations (there are some time limits suggested by producers), in general each session shouldn't last for more than 30 minutes – than you need to rest (15-20 minutes should be optimal) in order not to feel discomfort
- VR is (not) only for gaming
- VR is antisocial (it can be but musn't)
- VR isn't just a trend (but a long-term project that humanity remains invested in).

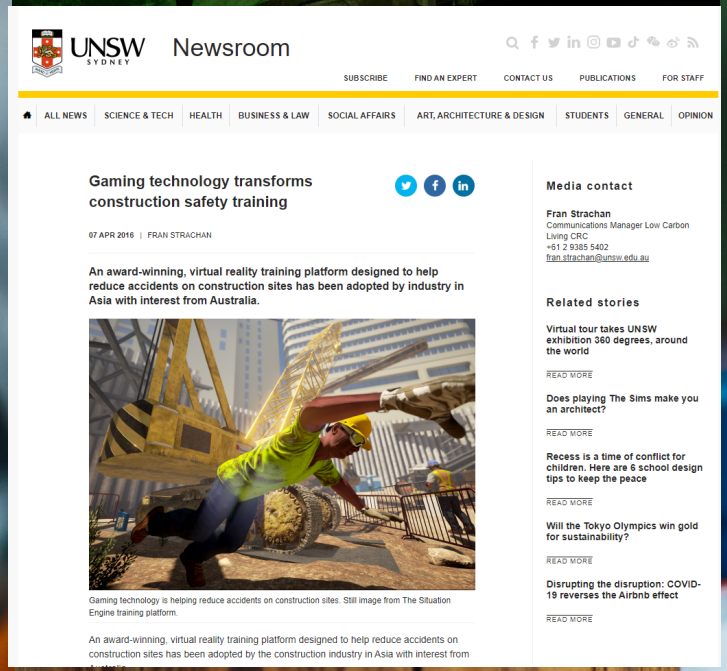
VR Weak points

- **In general, you need have hands occupied with controllers or gloves with sensors**
- **You should keep yourself in the safety area**
- When jumping into virtual reality for the first time, some users can get sick (stomach disorder)**.**
  Such devices have their limitations for people with labirynth disorders, risk of epilepsy and some other disabilities. Sometimes skin rush appears and diziness
- **They are still relatively expensive** (of course it depends on our financial possibilities), anyway even if it wouldn't be for equipment costs, than there is still an issue of **costs of development of the VR Learning environment** and **costs of training** of VR trainers.
- You learn here only in simulated environment (lack of responsability?) maybe it is like learning by doing but it is rather not Work-based Learning

Part 5: Conclusions for apprenticeships

Messages for VET teachers and trainers

Sense VR project for training in mines



- **Benefits: VR solutions are useful element of educational packages allowing to demonstrate interesting content and solutions as well as to train /re-train your abilities (alone or with an instructor) supporting learning retetntion**
- It can be a good training tool, complementnig other methods thanks to increased engagement and stimulation (It can be a very useful tool especially in the context of simulation of dangerous places like minings and construction sites)
- maybe VR is considered as effective as learning by doing but it is rather not Work-based Learning (i.a. in case of learning the responsability for losses on material etc.)
- VR has its limitations but in the educational proces „potentially offers greater personalised and inclusive learning approaches tailored to the needs of individual learners" (CEDEFOP, 2022, p.17) enabling continuation of the learning proces even in time of pandemia.

Conclusions

- **Challenges**: For VET teachers and trainers one of the main challanges could be different level of prior experiences with the VR (lack of experiences=reluctancy?) in order to learn tools, test training scenarios/environments and develop communication skills (conext of CPD)
- **Solution**: Disseminate training VR components for pedagogical courses for VET teachers and trainers by 2030
- **VR will not replace apprenticeships** but **it can make it more attractive** although this technology should be more disseminated among VET instructors and apprentices enabling them realisation in safe and flexible way of some elements that would require an access to the machine/equipment that this particular employer doesn't have
- In that context there is another interesting solution could be an Augmented Reality (AR)