NAME	VIRTUAL REALITY (VR)
Short description (What)	*Virtual reality, or VR, is taking off in education with an increasing number of schools adopting the technology.* *VR allows students to experience destinations from across the world without ever having to leave the classroom. Imagine students being able to explore the pyramids of Giza whilst sitting at their desks.* *This is what virtual reality education allows.*
Purpose/aim (why)	☒ Immediate evaluation of learning results ☐ Co-create contents (Conceptual maps) ☒ Acquisition of new pieces of knowledge ☒ Showing job processes and techniques ☐ Systematization of contents ☒ Experiencing practical activities ☒ Safety training
Contents/learning objects suitable *(on what)*	*Specific contents/objects trained with this specific solution:* ● *VR can be applicable for both high-level theory (advanced mathematics) and a practical skill training (welding simulators)* ● *Limited to the VR environment and scenario which is created, as of now, difficult to customize (there will be a change in a close future)* ● *Customizable if the co-creation with the 360 degree camera/video* *Some examples of application:* - *Maritime safety training* - *Welding simulations* - *Virtual trips* - *Veterinary education* - *Training of nurses*
Type and level of interaction	*The level of interaction:* - *Immersive interaction in real time (in a group or single)* - *interaction with objects (in real time, in a group or single, in common or on different objects or part of it, inside an environment or not, basically in any form or shape limited to the scenario avaiable)* - *interaction in real time with trainers and trainees*
Type of learning stimulated by the solution	*Verify if it's possible to close the responses and check the responses* ☒ Learning from experience ☒ Learning through creative thinking ☒ Learning from peer interaction ☒ Learning from a reflexive process ☒ Learning from imitation/observation ☒ Learning from "doing"

Digital solutions' brand names	Indicate the most common and different brands which propose that digital solution. VR is a very wide technology so it is very hard to limit it to specific brands or digital solutions. VR is similar to movies - there are plenty of genres and applications of this digital solution in education and in VET.
Technical equipment *(the technical equipment needed to support its use in training/teaching)*	In a table below are stated examples of the hardware available.

	MOBILE	STAND ALONE	VR with a computer
Manufacturer	*(Oculus Go)*	*(Oculus quest HTC Focus Plus)*	*(Oculus Rift S)*
Needed	*Mobile Phone VR goggles*		
Link to a list	https://www.aniwaa.com/buyers-guide/vr-ar/best-smartphone-vr-headset/ *(2021)*	https://www.cnet.com/tech/gaming/best-vr-headsets/ *(2022)* *	https://www.cnet.com/tech/gaming/best-vr-headsets/ *(2022)* **

* Mixed Stand Alone and PC VR
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Equipment conditions	*Regarding HW: purchased, shared with other classes* *Regarding SW: Licence, licence free options, the presence of an Educational version*
Costs	Mobile: 10-100 EUR Stand Alone: 290-500 EUR PC VR: 500+ EUR
Main technical problems that can be occurred / maintenance needs	As with any advanced technology, you can expect to experience technical difficulties. These issues could be any of the following: **Login issues** — Users may forget their username and password. **Low bandwidth** — Your current broadband connection may be slowed down if too many users are connected at once. **Content glitches** — The training content itself may have glitches due to poor content design and programming. **Navigation issues** — Learners may have issues navigating their VR training program and not know how to make selections, return to the menu, etc. **"Play area"** — Practical need to tune the play area every now and then to make sure the necessary space is still valid.
Methodological indications for trainers/teachers	Please indicate: - How the solution can be used (or is designed to use) during a lesson Regarding pedagogical methodologies, applying a constructivist-oriented - approach means pointing out some specific aspects.

Immersive VR for Teaching and Learning in VET: Methodology

Regarding curriculum design, it is important to design the course integrating VR experience when and where it brings added value and paying attention to balance and integrate VR activities with other learning activities.

Regarding the virtual environment and interactivity, it is important to design the VR environment by paying attention to stimulating cooperation at different levels among learners and with teachers, and with different tools (instant messages, etc.). The environment must be smart and accessible: the learning process must concentrate on learning objects and contents, and you do not need to spend too much time understanding how the VR environment works.
Finally, it is necessary to design a real environment culturally and socially contextualised which reproduces the real context (workshop/classroom) in which the learning process may occur.

Regarding the learning process integrate the VR experience in a more complex learning process structured (at least) in three phases: preparatory, VR experience and debriefing. This means that to support the action-thought circle process it is necessary to include VR experience inside a process that supports students to access the virtual environment and then reflect on the experience connecting that with theories.
In the preparatory phase, teachers can provide contents to learn in advance or develop activities for the VR experience. The VR experience can be enriched by group discussions, exercises, and collaborative activities.

The debriefing is necessary to show the process of
problem-solving to the learners: wrapping up all the choices and the decisions taken, the teacher supports learners to fix and connect practice and theory. In this phase, it is useful to provide tests and quizzes, along with an evaluation activity.
The preparatory phase and the debriefing can be organised inside the virtual environment and in the classroom (blended approach to learning courses), in groups or individually, at school or at home.

- Needed preparatory activities
Describing the whole experience to the participants
Preparing students in terms of understanding and using the equipment
Addressing students' questions even before engaging in the VR
Address potential adverse effects of using VR
Monitoring the students

- De-briefing solutions to be adopted

	In order to continuously adapt and improve the guidance and support for the participants, it is necessary to include points such as the following in the evaluation of the virtual teaching/learning experience: - How did the learners cope with the VR equipment in general? - How did they feel during the VR experience and afterwards? - How did the users cope in the actual virtual learning environment? - What support was needed from the teacher? - What further support would the learners have wished for?
Describe the use onsite of that solution	Precondition - VR hardware is set up and the software is downloaded and tested. The teacher explains the safety precautions to the students. The teacher explains the objective of the current VR scenario. The teacher assigns students to a buddy system (either in couples or groups of 3). The teacher monitors the students. Evaluation takes part (as explained above).
Describe the use in the distance setting of that solution	**Create Virtual Classroom** The virtual classroom can be created using the tools from Google Suite by accessing Google Classroom. After login in with teacher credentials, the teacher can create a virtual classroom by introducing at least the name of the course. In addition, the teacher can generate a Google Meet link that can be visible to the students that will allow them to connect with the teacher during the teaching/assessment process. **Invite students** The students must be invited to join the classroom created before. The invitation can be sent using classroom tools after adding the students to the virtual classroom or by sending an individual email with a virtual classroom code. **Upload Educational Materials** The educational materials should be in digital format in order to allow their upload on Google Classroom. Each teacher can choose what kind of digital educational materials will suit better to their teaching purposes. Based on this assumption and the tools provided by Google Classroom, the teachers can prepare and upload the information and content of their disciplines. The platform allows uploading even stand-alone applications similar to an executable program that is subject to practical training for example and inland and maritime navigation. **Create Scenarios for Practical Training** Practical training on the inland navigation simulator is usually performed in laboratory conditions, but in special cases imposed by COVID-19 restrictions can be done at home. For practical training, the students will have to accomplish the scenario and then

to upload their work to the virtual classroom, in the *Assignment/Practice Module* category.
The teacher creates the scenarios for practical training using gamification tools (for example in this Maritime navigation you can use the Ship simulator, or you can select any VR software).

Create Quiz for Theory Assessment
The assessment of theoretical aspects presented during the semester will be performed using a fast quiz with questions with multiple choice answers.

VR can improve any learning that involves design such as architecture. Students can wear a VR headset and view the models and drawings they have created in a virtual world. If the student has designed a hotel, they can go inside, walk around, and make adjustments to the building that will improve the potential customer experience.

Main pedagogical problems that can be occurred	Risk of "amusement park" approach to learning Students sidetrack the scenario or take too long to progress. Stand alone and PC VR - the battery runs out and the headset or controllers need recharging
Troubleshooting suggestions	Technical: Restart the application/software Restart the computer Re-define the "play area"
Role of the teacher/trainer	The teacher has two main roles: 1. Facilitator (selection of platform, integration to curriculum, creation of the class lesson) 2. Guardian (monitoring the students to ensure their safety)
Strengths *(regarding contents, techniques and processes)*	• The training usefulness of the error: a game is a protected environment in which a student can test errors avoiding consequences. After a failure, he/she can restart without fear to reach the final aim. • Immediate feedback provided during the game • The competition and the game as a lever for learning • An engaging storytelling: the game lies in a developed story in which learning contents are discovered step by step. This stimulates engagement and curiosity to follow the different game steps. • Through a game you can re-create a real situation (workplace) if no equipped rooms are available • Easy access, effectiveness and direct involvement of students
Weaknesses *(regarding contents, techniques and processes)*	• Bad internet connections can interrupt the creation of a multimedia presentation. • Outdated software does not support the platform. • Students do not have the appropriate equipment (computer or tablet, internet connection) at home. • The teacher does not have the skills and knowledge to use the equipment and the platform. • In general, the best platforms are in English. A lack of language skills can make it difficult to use the platform.

	● The level of students' digital competencies is uneven.			
Linked practices *(if available – see the other scheme)*	Gamification			
Main characteristics *(Evaluate each characteristic)*		Low	Medium	High
	Level of interaction among trainees during the experience	☐	☐	☒
	Level of interaction with the trainer during the experience	☒	☐	☐
	Autonomy in the use of the solution by the trainee	☐	☐	☒
	Easy to use (friendly?) by the trainee	☐	☐	☒
	Easy to use (friendly?) by the trainers	☐	☒	☐
	Level of peer-to-peer collaboration	☐	☒	☐
	Inclusiveness (in relation to disadvantaged groups)	☐	☐	☒
	Level of engagement	☐	☐	☒
	Student motivation			☒
Other relevant information	*There are a plethora of potential VR solutions to include in VET education, hence it is very difficult to specify what exact digital solution. I have attached a table with all the different software available from a different project (as an Excel name VR Digital technology comparison) to provide a small glimpse of the potential uses of VR in education.*			
Comments	*Highly applicable to all VET sectors, and the newest technology and digital solution available as of now.* *Suggestions for train the trainers: Motivation for the teachers and the potential of this digital solution*			
A contribution by	*Virsabi*			