



Formal and Non-Formal Learning in Virtual Environments

PhD Candidate:

Federico De Lorenzis

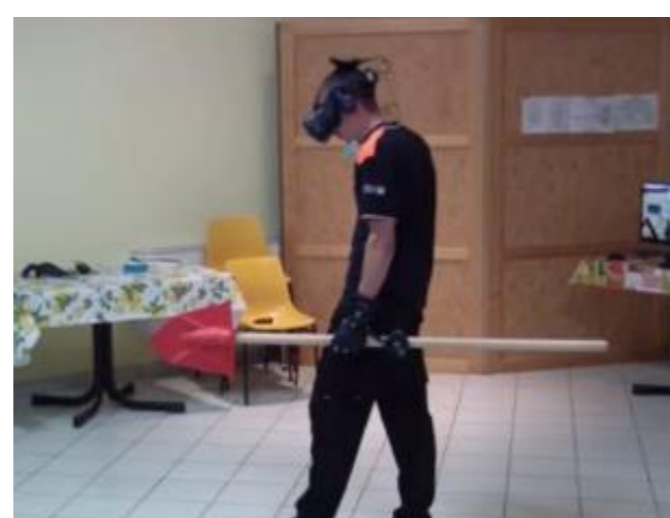
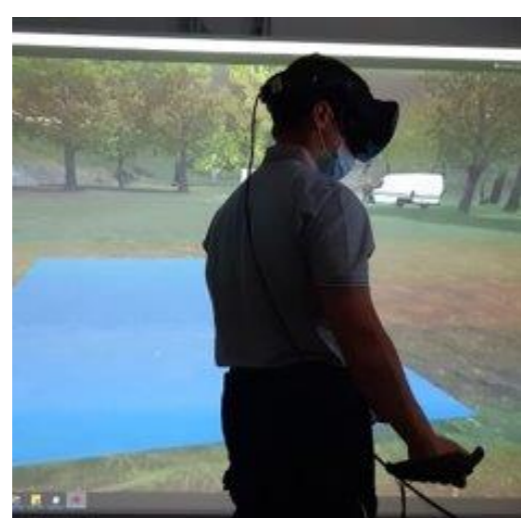
federico.delorenzis@polito.it

1. Introduction

Virtual Reality (VR) is a simulated experience that places the users inside a computer-generated environment. VR applications are often used for training purposes due to a series of advantages over real life exercises. VR training systems (VRTSs) are therefore widely adopted for the simulation of dangerous situations, complex procedures and expensive tools.

2. Goal

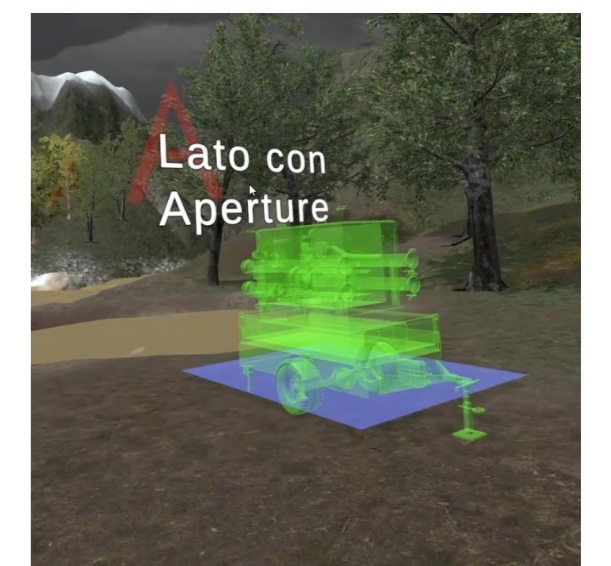
This research focuses on the use of VRTSs in **non-formal** (non-structured, e.g., training in industries) and **formal** (structured and standardized courses, e.g., in universities) educational contexts. In particular, the aim is to build upon the best practices developed in professional settings and transferring them into formal education to enhance the adoption of VR technologies in schools and universities.



3. Methods

VR applications can be used to digitally simulate physical phenomena, such as floods [1] and forest fires [2], offering high fidelity experiences without exposing the users to dangerous situations and associated risks. Furthermore, innovative interfaces (like *passive haptics*, namely tracked objects able to stimulate the sense of touch) can enhance the overall realism of the experience [2].

Concerning the training aspect of VRTSs, automatic guidance and evaluation systems can be added to them, to deliver the users the intended skills and assess them without the continuous presence of an instructor [3].



4. Contents

The use of VRTSs in non-formal and formal education is currently under study. First, several experiments [1] have been carried out in non-formal contexts to extrapolate a series of guidelines on the design of VR training experiences. Then, VRTSs have been introduced into structured courses to investigate their impact on learning and their advantages over standard education (e.g., video-based lessons) [2]. Finally, VRTSs developed in non-formal contexts have been leveraged for training university students and explore the use of VR in combination with different pedagogical approaches, such as the traditional and learning-by-teaching ones [3].

5. References

1. F. De Lorenzis, F. G. Praticò, and F. Lamberti, "HCP-VR: Training responders through a virtual reality application for hydrogeological risk management". In *Proc. of 6th International Conference on Human Computer Interaction Theory and Applications (HUCAPP)* (2022).
2. D. Calandra, F. De Lorenzis, A. Cannavò, and F. Lamberti, "Immersive virtual reality and passive haptic interfaces to improve procedural learning in a formal training course for first responders". *Virtual Reality* (2022).
3. F. De Lorenzis, F. G. Praticò, M. Repetto, E. Pons, and F. Lamberti, "Immersive virtual reality for procedural training: comparing traditional and learning by teaching approaches". *Computers in Industry* (2022).