Potential of Deployment of Virtual and Augmented Reality in Emergency Management Training via an Exploratory Interview Study

Valentina Pennazio, University of Macerata, Italy
Michele Genta, SIMNOVA Centre, University of Piemonte Orientale, Italy

ABSTRACT
This article presents the outcome of an exploratory survey aimed to detecting the strengths and weaknesses and the degree of acceptance of the use of virtual and augmented reality in training of confined or suspected pollution environments workers. Forty-five Italian professionals (public and private) that work in health and safety in workplace, in different roles, have been involved in the survey (e.g. trainers, augmented and virtual reality specialists, researchers, health personnel). The analysis of the survey showed that the use of augmented and virtual reality allows several training sessions in safety, teach workers to perceive the risk and manage the negative emotions that hinder the success of the work. These reflections helped us to hypothesize a training proposal with the use of augmented and virtual reality.

KEYWORDS
Augmented Reality, Negative Emotions, Risk, Training Proposal, Virtual Reality

INTRODUCTION
Italian and international laws on professional training in emergency management (DPR 177/2011, DLgs. 81/2008; OSHA, 2004) generally define the minimum requirements, the necessary contents and the methods of training for operators/rescuers who work in “high risk” environments (e.g. confined spaces and areas suspected of pollution). In these environments, accidents often are deadly. According to the law, the professional training required to work in these environments must treat, from a theoretical point of view, specific aspects of the considered work (e.g. in the event of an intervention to be carried out in a cistern, the information provided by the trainer to the operators should relate to the specific emergency management modalities of that context, instead of general information). While from the practical point of view, training must include frequent practical training not influenced by organizational, logistical, bureaucratic and economic problems (Menduto, 2013). Therefore, it is necessary to abandon the idea of a standardized and only theoretical training.
In the past, training courses provided to professionals working in these fields, were not adequate (Menduto, 2013); these have been redesigned, better defined and implemented to become more reactive and functional to the type of risk present in a specific context and in every action to be taken (State-Regions Agreement, 2016). If it is possible to provide specific content in relation to each potential problem to be addressed (selecting teaching / learning contents), how can we teach practical skills? Taking up the previous example, how can a specific rescue training be performed inside a tank if it is not immediately available to perform a targeted training? The analysis of the literature (Bacchetta et al., 2015; Menduto, 2015; Nicolucci, 2013; Sbrochi, 2018) highlights how the development of specific skills in emergency management is attributable to training courses that use active teaching methods (Barrow et al., 1980; Lotti, 2018; Stewart, 2014). These methods effectively link theoretical and practical knowledge. The simulation methodologies are part of these (Bonaiuti, 2017; Hetzner et al., 2011) as well as the use of highly sophisticated technologies (e.g. virtual and augmented reality, AR/VR). In some work environments (health, medical, business), excluding high-risk contexts, AR/VR are already an essential component of training. From this observation, the hypotheses that led the exploratory survey presented in the contribution emerged: “Can virtual instrument improve and speed up the learning process of operators who have to work in high-risk contexts and lead them to a greater perception of risk? What are the possible criticalities and potentialities in the introduction of such technologies? What is the degree of acceptance of these technologies in who must use them? The answer to the prenious questions should allow to draw information to define how a training session with AR/VR should be organized.

The survey was carried out through the administration of an online questionnaire addressed both to professionals in the sector (that they should provide training courses), and to who should receive training. The results of the survey indicate that to achieve a widespread use of AR/VR in emergencies management training courses is still long. There are some Italian experiences that are moving in this direction (e.g. SIMNOVA; Tecnologie d’Impresa; Cal-Teck) but there is still much distrust in who must provide and receive training. The reasons are due to various factors (e.g. the lack of knowledge of the trainers in the use of AR/VR in the teaching; lack of knowledge of the potential that these supports have in training; the belief that the use of these technological tools not develop permanent skills; unavailability of professionals to use these tools to train themselves). Despite these problems, the survey highlighted some potentiality connected to the use of AR/VR useful for organizing professional training.

**BACKGROUND**

**Virtual and Augmented Reality**

The current professional training courses, including those dedicated to “confined spaces” (even if marginally), are starting to use active training methodologies. According to Gherardi “the practical experience of those are learning is important. Learners are involved in real problem situations that allow them to develop knowledge and skills through reflection and understanding” (Gherardi, 2013). To support this training, in some cases, we can use the new technologies, for example the VR/AR.

VR/AR are not the same thing, and it is necessary to understand their distinctive elements because, from these elements, specific skills and different ways of training are developed.

VR “is the simulation of a real situation where the subject can interact through electronic technologies, unconventional and sophisticated interfaces (glasses and helmets on which the scene is represented and sounds are played) that give to users, the impression of being immersed in that environment. VR can provide the use of gloves (data-glove) equipped with sensors to simulate tactile stimulation and to translate the movements into instructions for the software” (Freina, Ott, 2015). There are two different types of VR: the immersive one (Jennett et al., 2008) and the non-immersive one (Robertson et al., 1993). In the first case, the user is completely isolated from the external environment
Related Content

Incidental Learning in 3D Virtual Environments: Relationships to Learning Style, Digital Literacy and Information Display
www.irma-international.org/article/incidental-learning-in-3d-virtual-environments/133861

Development of an Interactive Virtual 3-D Model of the Human Testis Using the Second Life Platform
www.irma-international.org/article/development-interactive-virtual-model-human/43577

Developing Collaborative Problem-Solving in an Online Training Program for Insurance Agents
www.irma-international.org/chapter/developing-collaborative-problem-solving-online/37984

Learning-by-Doing Teamwork KSA: The Role of Strategic Management Simulation
Víctor Martín-Pérez, Natalia Martín-Cruz and Pilar Pérez-Santana (2012). International Journal of Virtual and Personal Learning Environments (pp. 21-34).
www.irma-international.org/article/learning-doing-teamwork-ksa/67115

The Role of Lecturers and University Administrators in Promoting New E-Learning Initiatives
www.irma-international.org/article/the-role-of-lecturers-and-university-administrators-in-promoting-new-e-learning-initiatives/194029