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VIRTUAL REALITY FOR MEDICAL TRAINING: NOTES ON OPPORTUNITIES AND CHALLENGES

REALIDADE VIRTUAL PARA FORMAÇÃO MÉDICA: APONTAMENTOS SOBRE OPORTUNIDADES E DESAFIOS

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Training with virtual reality (VR) technologies is an expanding application field. Healthcare can largely benefit from it as VR offers many advantages over conventional training methodologies, especially when the goal is to train specialized technicians (Narciso et al., 2019). The capability of VR to recreate credible virtual environments that support natural interaction brings opportunities, such as creating complex but safe training environments, training both individuals and teams, and systematic training of both standard and unusual events. Another key advantage is the possibility that VR offers training teams that can be remotely located, allowing the training of different specialists that work across different institutions that are physically apart one from the other as well as it allows to overcome challenges imposed by physical restrictions such as the restrictions imposed by the COVID-19 pandemic (Ponti et al., 2020). These characteristics offer the potential to leverage the training quality and preparedness of specialized technicians while reducing the impact of the costs of the physical simulation for training and ease of access to the training simulation (Pottle, 2019). The field of mental health is another field of medicine that can take advantage of the potential of VR technologies. According to the World Health Organization1, COVID-19 had a significant impact in terms of mental health: it increased the global prevalence of anxiety and depression by 25% due to social isolation and fear of infection. VR has the potential to be a pivotal instrument in tackling the pandemic effects at this level. Due to the features of VR technology, it can be used not only as a social tool but also as a therapeutic tool by professionals, as it allows them to offer controlled virtual scenarios designed to stimulate stress relief and exposure therapy for persons with mental issues related to the pandemic. Despite all the potential and known advantages, there are still research lines to be pursued to improve further the quality and effectiveness of VR solutions for medical training. For instance, most medical training applications are developed independently, and there is no systematization between the different solutions in terms of technologies used and evaluation methodologies employed (Narciso et al., 2019). As so, it is crucial to put forward standards that can be used as a reference for developing VR-based medical training applications/programs. Furthermore, such standardization contributes to overcoming another gap in the field: skills certification. Having a trainer monitoring the virtual training sessions and allowing the personalization of the training to answer individual training needs is also a research direction that shall be considered. Currently, most VR applications for training are standalone applications that only allow users to do a straightforward procedure. However, it is important to allow the virtual training session to be monitored in real-time

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by a trainer to support or evaluate the trainee and allow the trainer to manipulate the training session to optimize the learning activity. One example is the possibility of the trainer defining key performance indicators for the training activity based on the trainees' level, increasing the training simulation difficulty, and triggering unusual events in the virtual environment to train the trainees to face the unexpected evolutions of a given clinical situation. Furthermore, in addition to real-time monitoring, the VR training solution shall offer the possibility of recording the virtual training sessions for debriefing purposes, so it is possible to analyze the trainees' performance and consolidate the learning process. Another limitation is related to the fidelity of simulation: most applications rely on audiovisual stimuli, but multisensory stimulation can be crucial to the application's success as a training tool. For instance, the smell that an incision releases or the stiffness of some muscles pose can influence the decision regarding the correct medical procedure to be performed. Using only audiovisual feedback to represent these scenarios, even if visual metaphors represent such odors or stiffness, can negatively impact training as they are not representative of the real-world scenario and can induce trainees into errors when facing the simulated scenarios in the real world. However, simply adding multisensory stimulation is not enough: it is required that the multisensory stimuli are coherent with the content depicted in the simulation and representative of the real--world scenario (Monteiro et al., 2020). Thus, pursuing multisensory stimulation, such as haptic feedback and smell, and studying its effect in medical VR-based simulations is also critical.

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