Human Factors in Virtual Experiences: a Literature Overview

Del Greco A. [1], Bani M. [2] , Rampoldi, G. [2], Ardenghi, S. [2], Strepparava M.G. [2] [3] [4], Galli P. [1] [3], Russo S. [2]

[1] Department of Earth and Environmental Sciences, University of Milano-Bicocca, Piazza dell'Ateneo Nuovo 1, Milano, Italy
[2] School of Medicine and Surgery, University of Milano-Bicocca, Via Cadore 48, Monza (MB), Italy
[3] MaRHE Center (Marine Research and Higher Education Center), Magoodholo sland Faafu Atoll, Maldives
[4] Department of Mental Health, ASST Monza, Monza, Italy

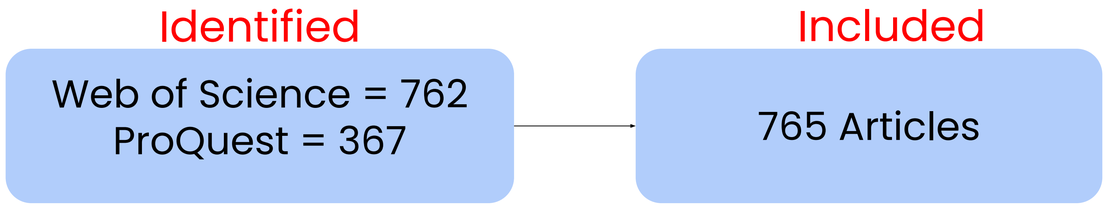
MUSA
MULTILAYERED URBAN SUSTAINABILITY ACTION

Aim

An overview of reviews was carried out to identify the critical factors in the fruition of user-side immersive experiences. The scope is to embrace a sustainability perspective within the metaverse(s) in order to foster psychological well-being, cultivate positive experiences, and mitigate potential negative impacts

Methods

Inclusion criteria:
- Publication between January 2008 and June 2023
- Targeting the use of an extended reality (ER) and the addressing psychological factors
- Systematic and Narrative reviews, Meta-analyses, and Syntheses
- English language



Findings

Psycho-social dimensions

- *Presence* and *sense of agency* in extended realities influence emotions, thinking, behaviours, relations, and perceptions.
- Immersiveness, body ownership and embodiment in ER have the potential for stimulating *perspective taking* which is an important mediator in empathy, mentalization, cooperation, altruism.

Education and Training

- Increased *engagement* and *motivation* especially with gamification, storytelling and interactive elements.
- Improved knowledge in *medical education*, yet not as effective as other educational methods in terms of skill-acquisition, satisfaction, confidence, and performance.
- Facilitated *communication* with specialists on long-distances and allow training.

Clinical Interventions

- Symptoms reduction in anxiety disorders, PTSD and addictions.
- Promising results in cognitive training in *dementia* and social skill training in *autism* spectrum disorder.
- VR-based relaxation and *mindfulness* training reduce anxiety and depression, and improve mood, sleep quality and emotion regulation.
- Promising evidence in *pain management* and in *reduction of fear and anxiety* related to medical procedures.

Design, Engineering, Tourism

- Increased designers' *empathy* to better understand users' needs, motivation, conditions.
- Promoting *imagination* and fostering inspiration.
- Allow easier understanding of 3D models.
- Efficient in hazard identification, safety inspections and training, and in *risk management* and education.
- *Time and cost-reduction* in simulating and designing smart cities.
- To promote cultural heritage education, allow *tourism in fragile sites*, provide information and deliver experiences.

Conclusions

Some **ethical concerns** and potential **long-term consequences** affecting the physical, cognitive and psycho-social domains still need to be addressed:

- Potential addiction to emotions elicited by virtual avatars and immersive experiences
- Risk of manipulation of agency
- Risk of depersonalization or other mental health issues
- Privacy concerns: physical, behavioural and psychological responses and data can be recorded
- Impact on the physical, cognitive, sensory and social domains on children and adolescents
- Intolerance of wearing glasses or headsets by people with impairments.

Open questions and future lines of research

- Role of Individual differences such as personality traits still unclear
- Scant data on ER usage in children and adolescents
- Unclear link between lucid dreaming, dissociative events, and ER usage

Finanziato dall'Unione europea NextGenerationEU
Ministero dell'Università e della Ricerca
Italiadomani
MUSA
Missione 4 - Istruzione e ricerca