

Exploring Immersive Learning Experiences

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Summary

Purpose and Importance of the Study for the UAE

Research shows that immersive technologies substantially improve learning since they simplify and simulate advanced concepts in several fields. Yet, there is a shortage of studies that evaluate the recent evidence-based immersive learning experiences utilized in classrooms or the public arena. This study aligns with two key UAE priorities: education for the future, and innovation and R&D. This research is of interest to the ministry of education. Immersive technologies in education remain limited due to various challenges such as cost and complexity. However, the evidence for effectiveness seems promising. As such, this study could be a reference for researchers and educators worldwide and in the UAE to develop effective and usable immersive learning experiences.

Methods

This study systematically reviews 42 articles to evaluate, compare, and reflect on contemporary immersive learning experiences employing seven dimensions: application field, the technology used, educational role, interaction techniques, evaluation methods, and challenges. The articles were selected based on several criteria: (1) The article presents an immersive learning experience using Virtual Reality (VR), Augmented Reality (AR), or Mixed Reality (MR) with sufficient details. (2) The article must present evidence of the effectiveness of the implemented immersive learning experience. (3) The article must be applied in a classroom setting or offered to the public.

Study Key Points

- (1) Key concepts to the study are introduced: Immersive learning, Virtual Reality, Augmented Reality, and Mixed Reality.
- (2) The study protocol, inclusion, and exclusion criteria are presented.

- (3) Results of answering seven research questions are presented. The questions tackle the application field, technology used, educational role, interaction techniques, evaluation methods, and challenges of applying immersive learning experiences.
- (4) An in-depth discussion of the answers to the research questions is presented, and a comparison with related review studies is made.

Findings

The results show that most immersive learning experiences target STEM (Science, Technology, Engineering, Math) topics and mainly utilize Head-mounted display (HMD) virtual reality in conjunction with marker-based augmented reality, while mixed reality was only represented in two studies. Moreover, the studies mostly used a form of active learning, and cited touch and hardware-based interactions allowing for viewpoint and select tasks. Further, the studies mostly utilized experiments and questionnaires for assessing the immersive experiences. The evaluations show improved performance and engagement and point to several usability issues.

Recommendations

First, future studies should consider designing immersive learning experiences for topics beyond STEM, such as arts and humanities. Second, future studies could experiment with existing tools that implement immersive learning experiences. Further, researchers could evaluate the usability of such tools and their appropriateness in the educational context. Third, future research could focus on the development of a conceptual framework helping educators identify contexts for implementing immersive learning experiences, in addition to guidance on deployment and integration into classroom settings. Fourth, future researchers should assess the usability of the immersive learning experiences during the design process.