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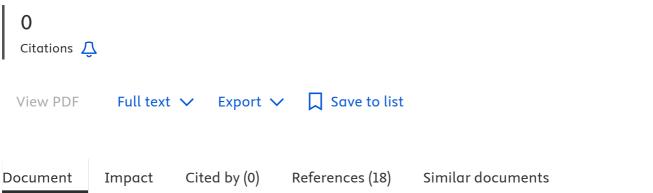
Augmented Reality in Tabletop Exercises As An Approach to Sustainable Disaster Preparedness Training: A Pilot Study

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Abstract

Disaster preparedness training is essential for enhancing the effectiveness and resilience of first responders. Conventional tabletop exercises (TTX) have been widely used for disaster training due to their structured yet low-risk nature. However, limitations such as a lack of realism and engagement necessitate innovative approaches. This study explores the integration of augmented reality (AR) technology into TTX to enhance training effectiveness. This study utilises an exploratory sequential mixed-methods research design in three phases. Phase 1 involved collecting qualitative data through document analysis, in-depth interviews, and non-participatory observations to develop a realistic

disaster scenario. Phase 2 transforms the identified disaster scenario into an AR-based TTX application using the Rapid Application Development (RAD) model. Phase 3 assesses the validity and usability of the AR-based TTX through a pilot study involving twenty undergraduate final-year nursing students who had undertaken an elective course (NURD 4412: Elective Disaster Nursing), evaluated using the System Usability Scale (SUS). Results demonstrate that the developed AR application provided an immersive and interactive training experience, fostering better engagement and realism than conventional TTX methods. The pilot study yields a SUS score of 58.4, classifying the application as 'Not acceptable' in terms of usability, which indicates that it faces significant usability issues when used in a tabletop exercise as an approach to sustainable disaster preparedness training. Key advantages included improved knowledge retention, real-time interaction, and enhanced decision-making skills among participants. However, limitations such as device compatibility issues and the need for technical support were identified, suggesting areas for future improvements. In conclusion, this study highlights the potential of AR-based TTX as an innovative and sustainable approach to disaster preparedness training. The findings underscore the need for further enhancements to optimise user experience and broaden accessibility, ultimately strengthening the capacity of emergency responders to manage disaster scenarios effectively. © 2025 IEEE.

Author keywords

Augmented Reality; Disaster Preparedness Training; Sustainable; Tabletop Exercises

Indexed keywords

Engineering controlled terms

Curricula; Decision making; Disaster prevention; Emergency services; Engineering education; Human computer interaction; Personnel training; Students; Usability engineering; User experience; User interfaces

Engineering uncontrolled terms

Augmented reality technology; Disaster preparedness; Disaster preparedness training; Disaster scenario; First responders; Innovative approaches; Pilot studies; Sustainable; System usability; Tabletop exercise

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