

Implementation of the Flipped Classroom Model Supported by a 3d Virtual Learning Environment in Emergency Distance Education: a Case Study

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Abstract

This study explores how integrating a 3D multi-user virtual learning environment into a flipped classroom model can support collaborative learning in emergency distance education contexts. A qualitative case study was conducted in a Fundamentals of Programming course over a five-week period using a distance flipped classroom approach. Pre- and post-class materials were delivered through the SAKAI Learning Management System (Kapsul), while synchronous sessions were conducted within a 3D multi-user online environment (Portal). The participants were 27 first-year university students enrolled in a Computer Programming program at a Vocational School of Technical Sciences in Turkey. Data were collected through weekly student/researcher journals and a final reflection form and analyzed thematically using content analysis. Findings indicate that integrating 3D environments into the flipped classroom significantly enhanced students' motivation, engagement, and sense of collaboration. Moreover, the model was found to facilitate comprehension and contribute positively to the overall learning quality. Students reported that the combination of pre-class video content and in-class game-based "experience zones" created a complementary structure that made learning more engaging, effective, and lasting. The interactive and gamified nature of the 3D environment encouraged active participation. Despite minor technical issues, students expressed overall satisfaction with the innovative learning experience. In conclusion, this study provides empirical evidence that 3D multi-user virtual environments can enhance the pedagogical effectiveness of flipped classrooms in remote learning settings.

Keywords: Distance Education, Flipped Classroom, Virtual Environment, Programming, Vocational School, Distance Flipped Classroom.