

Investigating students' immersion in relation to cultural heritage learning in a virtual reality environment

Yiannis Georgiou¹, Markos Souropetsis¹, Eleni A. Kyza¹ & Louis Nisiotis²
ioannis.georgiou@cut.ac.cy | markos.souropetsis@cut.ac.cy | eleni.kyza@cut.ac.cy | LNisiotis@uclan.ac.uk

¹Media, Cognition & Learning Research Group, Department of Communication and Internet Studies, Cyprus University of Technology
²School of Sciences, University of Central Lancashire, Cyprus

PROBLEM STATEMENT

- While immersion is largely discussed in the context of VR environments, there is a debate on whether it reflects a subjective psychological process or an objective concept reflecting the technical affordances of a VR system (Agrawal et al., 2020).
- Empirical studies have also often resulted in contradictory findings when comparing the learning effectiveness of VR to traditional instruction (non-VR) with low-immersion media (Hamilton et al., 2021).
- Immersion is a popular concept in HCI and games research but has received much less attention in the learning sciences.
- In our research we adopt a different perspective in two respects: (a) We posit that high levels of immersion should not always be taken for granted in VR environments, and (b) Rather than focusing on whether immersive VR can influence learning we find more value on focusing on “how” can immersive VR influence learning.

LEARNING ENVIRONMENT

- **Domain:** Cultural heritage/History learning
- **Mission:** Dating of a church ceiling mosaic through the collection of evidence
- **Pedagogical approach:** Inquiry learning
- **Single-user mode:** Use of Head-Mounted Display (HMD)
- **Gamification elements:**
 - Scoring system
 - Badges
 - Timer



PILOT STUDY

Research Questions

- To what extent are students immersed during a gamified VR activity about cultural heritage learning?
- How does immersion relate to students' learning?

Methods

- Case study approach
- Participants: Two higher education students
- Data collection: Questionnaires, Post-activity interviews, Screen recordings of the activity

Main findings

- Experienced immersion was differentiated between the students (high vs. low immersion)
- Positive relation of immersion to students' learning (conceptual knowledge, accomplishment of the inquiry mission)

Implications

- Subjective nature of immersion
- Immersion as a crucial experience driving users' learning (in alignment with our research in AR)
- Focus on the design of VR environments which can support learners' immersive experiences

QUASI-EXPERIMENTAL STUDY

Hypothesis and Research Question

- Gamification may contribute to students' immersion by making learning more engaging (Caponetto, 2014)
 - What is the impact of gamification on students' immersion and learning in a VR setting?

Methods

- Participants: 46 higher education students
 - Condition 1: Gamified VR activity ($n=23$)
 - Condition 2: Non-gamified VR activity ($n=23$)
- Data collection: Virtual Reality Immersion questionnaire (Georgiou & Kyza, 2017), Usability questionnaire, Conceptual understanding test, Post-activity interviews

Main findings

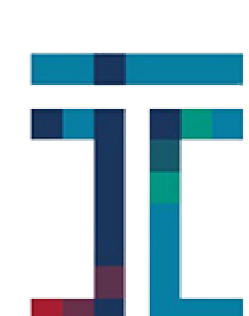
- No statistical differences in the usability of the gamified and non-gamified environments
- Students in the gamified condition, as compared to the non-gamified condition:
 - Experienced higher immersion, in terms of flow [$t=2.42$, $p<0.05$]
 - Had higher learning gains [$t=2.64$, $p<0.05$]

Implications and next steps

- Gamification elements can support students' engagement with the learning process and increase their experienced immersion and learning gains
- In ongoing analyses, we are examining relations between motivation, immersion and learning, using quantitative and qualitative data.



Scan to learn more about
the VR environment



Cyprus
University of
Technology



MEDIA, COGNITION AND LEARNING
RESEARCH GROUP