*Journal of Universal Computer Science, vol. 26, no. 8 (2020), 854-857*
*submitted: 20/7/20, accepted: 14/8/20, appeared: 28/8/20* 

# Exploring Immersive Technologies in Learning

# J.UCS Special Issue

**Anasol Peña-Rios**
(BT Research Labs, Ipswich, UK
acpena@ieee.org)

**Daphne Economou**
(University of Westminster, London, UK
d.economou@westminster.ac.uk)

**Markos Mentzelopoulos**
(University of Westminster, London, UK
mentzem@westminster.ac.uk)

Immersive technologies have presented very promising opportunities for innovation in learning. In recent years, they have become more accessible and we are just beginning to see an increase in their adoption, addressing user needs in various domain, particularly in education. At the time of this writing (second quarter, 2020) and given the global emergency situation that COVID-19 has imposed to the world, it is more relevant than ever to look at ways to materialise the promise that they represent, tackling some of the bigger challenges that the society face. Therefore, we, the community of scholars and practitioners at the intersection of learning, technology and game sciences, find ourselves at the centre of a massive opportunity to demonstrate the potential that Immersive Learning can bring to support society in this challenging times, as the world continues to deal with a global health crisis.

This special issue was organised in conjunction with the Immersive Learning Research Network (iLRN at http://immersivelrn.org/). iLRN is an international organization of scholars, practitioners and professionals collaborating to develop a comprehensive research and outreach agenda that encompasses the breadth and scope of learning potentialities, affordances and challenges of immersive learning environments.

We are proud to present this special issue of the Journal of Universal Computer Science (J.UCS) on Exploring Immersive Technologies in Learning. While the editors are members of the iLRN community, for this special issue we solicited contributions from the general public and the iLRN community. J.UCS is an open-access journal, and following their ethos, our call for papers was disseminated widely and was open to any scholar. In addition, we invited authors from the iLRN community who have published their work in the annual iLRN conference, but this did not mean that we restricted submissions to this community.

As a result, we received nineteen submissions in total, from which seventeen were deemed appropriate for refereeing. After the first peer-review round eleven were considered for a second revision, and nine were accepted in the final round (47.37% final acceptance rate). We had very strong submissions, reflecting the diverse nature of the topics that explore the uses of immersive technologies in learning scenarios.

The articles presented in this special issue include practical accounts such as lessons learned (Nisotis & Kleanthous), assessing impact (Johnson et al.) and insights of using VR in Higher Education (Young et al.), STEM teaching (Thompson et al), and authoring tools (Horst et al.), comparison of technological settings (Han et al.), novelty approaches to inclusion for people with disabilities (Economou et al.), and the current state-of-the-art in game-based learning (Pellas & Mystakidis) and in immersive learning (Beck et al.). A brief introduction to each of these articles can be found below.

- In *Lessons Learned Using a Virtual World to Support Collaborative Learning in the Classroom*, Louis Nisiotis and Styliani Kleanthous present empirical findings of several studies that use virtual worlds for collaborative learning in the classroom, focusing on usefulness, engagement, motivation and VR support.

- In *Assessing the Impact of Game Modalities in Second Language Acquisition: ELLE the EndLess Learner*, Emily K. Johnson, Amy Larner Giroux, Don Merritt, Gergana Vitanova and Sandra Sousa present a study to assess different game modalities (and technologies) in second language acquisition, reporting on learning gains and users' perception on the learning activity, discussing on playability, engrossment, enjoyment, gratification, and immersion.

- In *Exploring Virtual Reality in the Higher Education Classroom: Using VR to Build Knowledge and Understanding*, Garetht W. Young, Sam Stehle, Burcin Yazgi Walsh and Egess Tiri provide insights on students' experience using VR in higher education to observe the learning impacts of using mixed reality as an immersive, interactive, and explorative technology to support for Physical Geography students, addressing some of the challenges from teachers' perspectives.

- In *Influence of Virtual Reality on High School Students' Conceptions of Cells*, Meredith Thompson, Annie Wang, Cigdem Uz Bilgin, Melat Anteneh, Dan Roy, Philip Tan, Rik Eberhart and Eric Klopfer present a study that evaluates how VR could be used to help with some of the challenges that students have in understanding abstract knowledge, discussing the implications of incorporating game-based approaches and immersive technologies into biology education.

- In *Bite-Sized Virtual Reality Learning Applications: A Pattern-Based Immersive Authoring Environment*, Robin Horst, Ramtin Naraghi-Taghi-Off, Linda Rau, and Ralf Dörner report on the efficacy of a pattern-based approach to micro-learning using an authoring tool to design virtual reality learning applications based on the concept of bite-sized learning.

- In *Comparing Collaboration Fidelity between VR, MR and Video Conferencing Systems: The Effects of Visual Communication Media Fidelity on Collaboration*, Sangsun Han, Kibum Kim, Seonghwan Choi and Mankyu Sung present a study comparing fidelity in different technological settings for collaborative activities, focusing on usefulness and efficiency in solving tasks.

- In *Using Serious Games for Learning Sign Language Combining Video, Enhanced Interactivity and VR*, Daphne Economou, Melissa Gonzalez Russi, ioannis Doumanis, Markos Menthelopoulos, Vassiliki Bouki and Jeffery Ferguson present their efforts towards the implementation of a serious game within a virtual reality environment for teaching British Sign Language (BSL) aiming to increase the population being able to communicate with people with hearing disabilities reducing the barriers, and discrimination they face every day struggling in social interaction.

- In *A Systematic Review of Research about Game-based Learning in Virtual Worlds*, Nikolaos Pellas and Stylianos Mystakidis present a systematic literature review of the current state of knowledge and practice about game-based learning approaches in virtual worlds from Primary to Secondary (K-12) until Higher education (HE), proposing recommendations for game design and development to support learning in VWs.

- In *Finding the Gaps about Uses of Immersive Learning Environments: A Survey of Surveys*, Dennis Beck, Leonel Morgado and Patrick O'Shea present a systematic review of survey papers in the domain of Immersive Learning, explaining their rationale for conducting it and the methodology used, going beyond the technocentric perspectives, and identifying gaps in the literature, which could be used to guide future research on uses of immersive learning environments.

We thank the iLRN leadership team, in particular iLRN Scientific Advisors Professors Christian Gütl and Leonel Morgado, and the J.UCS consortium, particularly Ms Dana Kaiser for her support and excellent work in producing this issue. We are indebted to our expert editorial board, listed below, who graciously volunteered their time and effort providing with important insights to improve the articles included here, and which otherwise would not be possible to present this special issue.

**Editorial Board (Reviewers – Alphabetical Order)**

- Ioannis Doumanis, University of Central Lancashire, UK
- Kai Erenli, UAS bfi Vienna, Austria
- Louis Nisiotis, Sheffield Hallam University, UK
- Malek Alrashidi, University of Tabuk, KSA
- Michael Gardner, University of Essex, UK
- Nikolaos Pellas, University of Western Macedonia, Greece
- Petros Lameras, Coventry University, UK
- Pilar Lacasa, University of Alcalá, Spain
- Wulfrano Arturo Luna-Ramirez, UAM, Mexico

These articles showcase the interdisciplinary nature of immersive technologies in learning, along with some of the possible benefits and multiple challenges of adopting them. It is our hope that this special issue reflects on the promise these technologies portrait, and the important work that our community does.

Anasol Peña Rios
Daphne Economou
Markos Mentzelopoulos
Ipswich & London, UK, August 2020