

iLRN 2017 Coimbra

Workshop, Long and Short Paper, and Poster
Proceedings from the Third Immersive Learning
Research Network Conference

Dennis Beck
Colin Allison
Leonel Morgado
Johanna Pirker
Foad Khosmood
Jonathon Richter
Christian Gütl (Eds.)



ISBN (e-book)
978-3-85125-530-0

DOI
10.3217/978-3-85125-530-0

Editors

Dennis Beck, Walden University, US
Colin Allison, University of St. Andrews, UK
Leonel Morgado, Universidade Aberta, Portugal
Johanna Pirker, Graz University of Technology, Austria
Foad Khosmood, California Polytechnic State University, USA
Jonathon Richter, Salish Kootenai College, US
Christian Gütl, Graz University of Technology, Austria

ISSN iLRN: 2415-1475
ISBN (e-book): 978-3-85125-530-0
DOI: 10.3217/978-3-85125-530-0

Copyright © 2017 Verlag der Technischen Universität Graz www.ub.tugraz.at/Verlag

This work is published under the Creative Commons Attribution-NonCommercial-NoDerivs 4.0 International License (CC BY-NC-SA 4.0)

The terms are defined at <https://creativecommons.org/licenses/by-nc-sa/4.0/> and summarized below:

Attribution - You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

NonCommercial - You may not use the material for commercial purposes.

ShareAlike - If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original.

Conference Organization**iLRN Executive Director**

Jonathon Richter Salish Kootenai College, USA

General Chair

Michael Gardner University of Essex, UK

Academic Chair

Christian Gütl Graz University of Technology, Austria

Community Chair

Jonathon Richter Salish Kootenai College, USA

Program Chair

Colin Allison University of St Andrews, UK

Special Tracks and Workshops Co-Chair

Johanna Pirker Graz University of Technology, Austria

Special Tracks and Workshops Co-Chair

Foaad Khosmood California Polytechnic State University, USA

Publications Chair

Dennis Beck University of Arkansas, USA

Finances Chair

Patrick O'Shea Appalachian State University, USA

Publicity & Public Relations Co-Directors

Anasol Peña-Rios University of Essex, UK

Samah Felemban University of Essex, UK

Submissions system director

Johanna Pirker Graz University of Technology, Austria

Conference Registration Director

Anasol Peña-Rios University of Essex, UK

Website Director

Anasol Peña-Rios University of Essex, UK

Local Organization**Local Co-Chair**

Leonel Caseiro Morgado Universidade Aberta & INESC TEC, Portugal

Local Co-Chair

Ana Amélia Carvalho Universidade de Coimbra, Portugal

Local Co-Chair

João Caetano Universidade Aberta, Portugal

Student Volunteer Gonçalo Cruz	UTAD, Portugal
Student Volunteer Daniela Pedrosa	UTAD, Portugal
Student Volunteer Fernando Cassola	UTAD, Portugal
Student Volunteer Ricardo Nunes	Brazil
Student Volunteer Luis Miguel Sequeira	UTAD, Portugal
Student Volunteer Luis Fernandes	UTAD, Portugal
Student Volunteer Cristiane T. Machado	FPCE, Universidade de Coimbra, Portugal
Student Volunteer Wilson M. Godinho	FPCE, Universidade de Coimbra, Portugal
Student Volunteer Renato Mamede	FPCE, Universidade de Coimbra, Portugal

International Chairs

North America Co-Chair Krista Terry	Appalachian State University, USA
North America Co-Chair Minjuan Wang	San Diego State University, USA
Latin America Co-Chair Victor Manuel Zamudio Rodríguez	Instituto Tecnológico de León, Mexico
Latin America Co-Chair Marina Vicario Solórzano	Instituto Politécnico Nacional, Mexico
South America Co-Chair Andreas Pester	Carinthia University of Applied Sciences, Austria
South America Co-Chair Roger Tavares	UFRN, Brazil
South America Co-Chair Eliane Schlemmer	UNISINOS, Brazil
South America Co-Chair Luís Carlos Petry Pontificia	Universidade Católica de São Paulo, Brazil

Asia Pacific Co-Chair Yiyu Cai	Nanyang Technological University, Singapore
Asia Pacific Co-Chair Henry Been-Lirn Duh	University of Tasmania, Australia
Asia Pacific Co-Chair Erik Champion	Curtin University, Australia
Europe Co-Chair Ralf Klamma	RWTH Aachen University, Germany
Europe Co-Chair Fotis Liarokapis	Masaryk University, Czech Republic
Middle East Co-Chair Mohammad Al-Smadi	Jordan U. of Science & Technology, Irbid, Jordan
Middle East Co-Chair Samir Abou El-Seoud	The British University in Egypt (BUE), Egypt
Africa Chair Mathy Vanbuel	Informatics & Telecommunications, Belgium
iLRN Advisory Board Jon Dorbolo Francois Garnier Beatrice Hasler Pasi Mattila Carlos Delgado-Kloos	Oregon State University, USA École Nat Supérieure des Arts Décoratifs, France Interdisciplinary Center Herzliya, Israel Center for Internet Excellence, Finland Universidad Carlos III de Madrid, Spain
Program Committee Abelardo Pardo Agnes Kukulska-Hulme Alberto Cardoso Alexander Nussbaumer Alexandra Câmara Alla Vovk Allan Fowler Alok Mishra Ana A. Carvalho Ana Isabel Veloso Anasol Peña-Rios Andreas Schmeil Brenda Bannan Britte Cheng Bruno Joho Carl Smith Carlo Vizzi Carlos Delgado Kloos Christian Gütl Christoph Igel Claudio Brito Colin Allison Daniel Livingstone	The University of Sydney, Australia The Open University, UK University of Coimbra, Portugal Graz University of Technology, Austria Universidade Aberta, Portugal Oxford Brookes University, UK Kennesaw State University, USA Atilim University, Turkey University of Coimbra, Portugal University of Aveiro, Portugal University of Essex, UK immpres, Switzerland George Mason University, USA SRI International Lucerne Univ of App Science & Arts, Switzerland Ravensbourne University, UK ALTEC, Italy Universidad Carlos III de Madrid, Spain Graz University of Technology, Austria Centre for e-Learning Technology, Germany COPEC, Brazil University of St Andrews, UK Glasgow School of Art, Scotland

Daphne Economou	University of Westminster, UK
David Lowe	The University of Sydney, Australia
Davinia Hernandez-Leo	Universitat Pompeu Fabra, Spain
Demetrios Sampson	Curtin University, Australia
Dennis Beck	University of Arkansas, USA
Diana Urbano	University of Porto, Portugal
Dominic Kao	Massachusetts Institute of Technology, USA
Dor Abrahamson	UC Berkeley, USA
Edmundo Tovar	Universidad Politecnica de Madrid, Spain
Elisabetta Parodi	Lattanzio Learning S.p.A.
Erik Champion	Curtin University, Australia
Ferial Khaddage	Deakin College/University, Australia
Fridolin Wild	The Open University, UK
Foad Khosmood	California Polytechnic State University, USA
George Ioannidis	University of Patras, Greece
Giuliana Dettori	Istituto di Tecnologie Didattiche del CNR, Italy
Guenter Wallner	University of Applied Arts Vienna, Austria
Gustavo Alves	Polytechnic of Porto, Portugal
Hanan Gazit	Tel-Aviv University, Israel
Helen Wauck	University of Illinois Urbana-Champaign, USA
Helena Murteira	Universidade de Évora, Portugal
Ignazio Passero	Università degli Studi di Salerno, Italy
Ilona Buchem	Beuth University, Germany
Ioana Stanescu	UNAP
István Koren	RWTH Aachen, Germany
Jaakko Karjalainen	VTT, Finland
Jana Pejoska	Aalto University, Finland
Jannicke Baalsrud Hauge	University of Bremen, Germany
João Relvão	Universidade Aberta, Portugal
João Carlos Caetano	Universidade Aberta, Portugal
Jesús de La Fuente	University of Almería, Spain
Jochen Kuhn	University of Kaiserslautern, Germany
Johanna Pirker	Graz University of Technology, Austria
Jonathon Richter	Salish Kootenai College, USA
Jose Zagal	DePaul University, USA
Jose Juan Dominguez Veiga	Maynooth University, Ireland
Justin Ehrlich	Western Illinois University, USA
Kai Erenli	UAS bfi Vienna, Austria
Kaj Helin	VTT, Finland
Leonor Botelho	Universidade do Porto, Portugal
Leonel Caseiro Morgado	Universidade Aberta & INESC TEC, Portugal
Lisa Gjedde	Aalborg Universitet, Denmark
Louis Nisiotis	Sheffield Hallam University, UK
Luiz Fernando Capretz	Western University, Canada
Manuel Gericota	ISEP, Portugal
Manuel Castro	UNED, Spain
Marcus Specht	Open University of the Netherlands, Netherlands
Margit Höfler	University of Graz, Austria
María Blanca Ibáñez	Universidad Carlos III de Madrid, Spain
Mario Aehnelt	Fraunhofer IGD Rostock, Germany
Markos Mentzelopoulos	University of Westminster, UK
Max North	Southern Polytechnic State University, USA
Melany Ciampi	Science and Education Research Council, Brazil
Michael Gardner	University of Essex, UK
Michael Thomas	University of Central Lancashire, UK

Mikhail Fominykh	Europlan UK Ltd, UK
Milos Kravcik	RWTH Aachen University, Germany
Minjuan Wang	San Diego State University, USA
Monique Janneck	Fachhochschule Lübeck, Germany
Nelson Zagalo	University of Minho, Portugal
Puneet Sharma	University of Tromsø, Norway
Rainer Malaka	University of Bremen, Germany
Ralf Klamma	RWTH Aachen University, Germany
Rob Nadolski	Open University of the Netherlands, Netherlands
Roland Klemke	Open University of the Netherlands, Netherlands
Ryan Locke	Abertay University, UK
Samuel Mascarenhas	Instituto Superior Técnico, Portugal
Stephanie Linek	ZBW Information Centre for Economics, Germany
Styliani Kleanthous	University of Cyprus, Cyprus
Stylios Mystakidis	University of Patras, Greece
Timo Koskela	University of Oulu / CIE, Finland
Victor Alvarez	Murdoch University, Australia
Victor Callaghan	University of Essex, UK
Volker Settgest	Fraunhofer Austria Research GmbH, Austria
Wafa Bourkhis	Universities of Artois (France) and Tunis (Tunisia)
Will Guest	Oxford Brookes University, UK
Yifei Wang	University of British Columbia, Canada

Special Track on Personalisation in Immersive and Game-Based Learning Environments

Special Track Chairs

Alexander Nussbaumer	Graz University of Technology, Austria
Rob Nadolski	Open University of the Netherlands, Netherlands
Samuel Mascarenhas	INESC-ID, Portugal

Program Committee

Sylvester Arnab	Coventry University, UK
Francesco Bellotti	University of Genoa, Italy
Liz Boyle	University of the West of Scotland, UK
Alessandro Di Gloria	University of Genoa, Italy
Dai Griffiths	University of Bolton, UK
Paul Hollins	University of Bolton, UK
Johan Jeuring	Utrecht University, Netherlands
Johann c.k.h. Riedl	The University of Nottingham, UK
Pedro Santos	University of Lisbon, Portugal
Krassen Stefanov	Sofia University, Bulgaria
Isabel Trancoso	INESC-ID, Portugal
Zerrin Yumak	Utrecht University, Netherlands
Carsten Ullrich	DFKI, Germany

Special Track on Digital Heritage and the Immersive City

Special Track Chairs

Alexandra Gago da Câmara	Universidade Aberta, Portugal
Helena Murteira	University of Évora, Portugal
Maria Leonor Botelho	University of Porto, Portugal

Program Committee

Jim (CS) Ang	University of Kent, UK
Elizabeth Carvalho	Open University Lisbon, Portugal
Luís Magalhães	University of Minho, Portugal
Mauro Figueiredo	University of Algarve, Portugal
António Fernando Coelho	University of Porto, Portugal

Special Track on Immersive and Engaging Educational Experiences**Special Track Chairs**

Johanna Pirker	Graz University of Technology, Austria
Foad Khosmood	California Polytechnic State University, USA

Program Committee

Allan Fowler	Kennesaw State University
Brian Mcdonald	Glasgow Caledonian University, UK
Dominic Kao	Massachusetts Institute of Technology, USA
Kai Erenli	UAS bfi Vienna, Austria
Ryan Locke	Abertay University, UK
Volker Settgest	Fraunhofer Austria, Austria
Kai Erenli	University of App Sciences BFI Vienna, Austria
Zoë J. Wood	California Polytechnic State University, USA
Britte H. Cheng	SRI International, USA
Helen Wauck	University of Illinois Urbana-Champaign, USA
Guenther Wallner	University of Applied Arts Vienna, Austria

Special Track on Wearable Technology Enhanced Learning**Special Track Chairs**

Ilona Buchem	Beuth University of App Sciences Berlin, Germany
Ralf Klamma	RWTH Aachen University, Germany,
István Koren	RWTH Aachen University, Germany
Fridolin Wild	Oxford Brookes University, UK
Alla Vovk	Oxford Brookes University, UK

Program Committee

Mario Aehnelt,	Fraunhofer IGD Rostock, Germany
Davinia Hernández-Leo	Universitat Pompeu Fabra, Spain
Carlos Delgado Kloos	UC3M, Spain
Elisabetta Parodi	Lattanzio Learning Spa, Italy
Carlo Vizzi	Altec, Italy
Mar Perez Sangustin	Pontificia Universidad Católica de Chile, Chile
Isa Jahnke	University of Missouri-Columbia, USA
Jos Flores	MIT, USA
Michael Fominykh	Europlan, UK
Puneet Sharma	University of Science and Technology, Norway
Yishay Mor	Levinsky College of Education, Israel
Tobias Ley	Tallinn University, Estonia
Peter Scott	Sydney University of Technology, Australia
Victor Alvarez	Murdoch University, Australia
Agnes Kukulska-Hulme	The Open University, UK
Carl Smith	Ravensbourne University, UK
Victoria Pammer-Schindler	Graz University of Technology, Graz, Austria
Christoph Igel	CeLTech, Germany
Peter Mörtel	Virtual Vehicle, Austria

Brenda Bannan	George Mason University, USA
Christine Perey	Perey Consulting, Switzerland
Kaj Helin	VTT, Finland
Jana Pejoska	Aalto, Finland
Jaakko Karjalainen	VTT, Finland
Joris Klerxx	KU Leuven, Belgium
Marcus Specht	Open University, Netherlands
Roland Klemke	Open University, Netherlands
Will Guest	Oxford Brookes University, UK

Special Track on Serious Games using Immersive and Assistive Technologies

Special Track Chairs

Markos Mentzelopoulos	University of Westminster, UK
Daphne Economou	University of Westminster, UK
Phil Trwoga	University of Westminster, UK

Program Committee

Eelco Braad	Hanze University of Applied Sciences, Netherlands
Dr Nick Degens	Hanze University of Applied Sciences, Netherlands
Johanna Pirker	Graz University of Technology, Austria
Dr Aristidis Protopsaltis	Friedrich-Alexander-University, Germany
Dr Panagiotis Antoniou	Aristotle University of Thessaloniki, Greece
Dr Vassiliki Bouki	University of Westminster, UK

Special Track on Immersive Experiences in Later Age

Special Track Chairs

Ana Isabel Veloso	University of Aveiro, Portugal
Ruth Contreras Espinosa	INCOM- UAB-Uvic

Program Committee

Alexandra Lopes	University of Porto, Portugal
Ana Beatriz Bahia	Casthalia Digital Art Studio, Brazil
Ana Carla Amaro	University of Aveiro, Portugal
Beatriz Sousa Santos	University of Aveiro, Portugal
Carlos Santos	University of Aveiro, Portugal
Carsten Moller	German Sport University, Germany
Célia Soares	ISMAI, Portugal
Eugene Loos	University of Amsterdam, Netherlands
Leonel Morgado	Universidade Aberta, Portugal
Liliana Sousa	University of Aveiro, Portugal
Luiz Adolfo Andrade	University of Estado da Bahia, Brazil
Lynn Alves	Universidade do Estado da Bahia, Brazil
Mário Vairinhos	University of Aveiro, Portugal
Maria Piedade Brandão	University of Aveiro, Portugal
Paulo Dias	University of Aveiro, Portugal
Sonia Ferreira	Institute Polytechnic of Viseu, Portugal

Sponsors



Graz University of Technology

Graz University of Technology, Institute for Interactive Systems and Data Science



MDS Global Insurance & Risk Consultants



Journal of Universal Computer Science



CRITICAL Software

Table of Contents

Main Conference

Main Conference Preface	1
-------------------------------	---

Keynote and Featured Speakers

Curtis Bonk, Indiana University, USA	3
Minjuan Wang, Shanghai International Studies University, China, San Diego State University, USA	5
Alan Miller, University of St Andrews, Scotland and the Smart History company	7
Nelson Vilhena, Critical Software	9
Carsten Ulrich, German Research Center for Artificial Intelligence (DFKI), Germany	14
Jonathon Richter, Immersive Learning Research Network & Salish Kootenai College, USA	15

Long Papers

Fieldscapes – Creating & Evaluating a 3D Virtual Fieldtrip System..	18
Enhancing foreign language learning in 3D immersive worlds – a study report	30
Assessment for Learning and Gamification - Can Two Walk Together, Except They be Agreed?	42
GAMES & GAMIFICATION IN THE PEDAGOGY DEGREE: an alternative to Distance Education models	54
Effects of natural user interfaces on user experience, activation and task performance in immersive virtual learning environments ...	68
Improving Reading Literacy with an Immersive Learning App	80
Screenwriting framework for an interactive Virtual Reality Film	92

Short Papers

Using Multiplayer Digital Games to Support Collaboration in Health Education	103
Enhancing strategies for cultural and natural heritage through the ALForLab Geographical Information System	109
Applying Mobile EEG to Measure Attention and Reading Time for Picture Books	121
Cultural Heritage Reconstruction Based on Virtual Reality Technology: A Pilot Study of Taiwanese Historical Site	129
How to gamify classroom? A proposal for training Teachers	136
Integrating Wearable Technologies and Sport Analytics for Personalized Immersive Training and Learning	144
Immersive Learning of Biomolecules	156
Adopting Game Technology for Heritage Information Modelling	162
A Digital Museum Infrastructure for Preserving Community Collections from Climate Change	170

Workshop

Imagine 2017	179
Gamification and Mixed Reality	180
Augmented Reality Trends in Education	181

Posters

Proposed Model security best practices using Immersive Virtual Reality in Social Engineering	183
Transmedia Story-weaving: Designing immersive transmedia experiences for higher education	186
V-Label : an experiment on how Augmented Reality impacts memorization	189
Immersion strategies in nonfiction digital narratives: A Short History of the Highrise, a case study	204
The use of a Cyber Campus to Support Teaching and Collaboration: An Observation Approach	193

Special Tracks

Special Tracks Preface	195
------------------------------	-----

ST: Personalisation in Immersive and Game-Based Learning**Environments**

Analysing and adapting communication scenarios in virtual learning environments for one-to-one communication skills training	197
Interaction of Learning Management Systems and Gaming Platforms in the Context of Competence Based Learning	205

ST: Digital Heritage and the Immersive City

Phygital Heritage: an Approach for Heritage Communication	220
Once upon a time in Pergamon: Reality and Representation in the Hellenistic City.....	230

ST: Immersive and Engaging Educational Experiences

Towards a Transmedia Learning Approach in ESL context	240
Travel through the oceans: augmented reality to enhance learning in early childhood education	248

ST: Wearable Technology Enhanced Learning

The use of sensors in virtual worlds for obesity control	257
Relaxation Simulator with Biofeedback: Discussion of Wearability.....	270

ST: Serious Games using Immersive and Assistive Technologies

Training teachers to employ a digital art history curriculum: An evaluation of the Crystal Bridges mixed distributed and virtual reality professional development.....	283
360-degree interactive video application for Cultural Heritage Education	297
Evaluating the Lifelog: Assessment of Recall using Galvanic Skin Response.....	305
Drinking Games: Simulating Alcoholic Behaviour Patterns in the "Pubcrawler" Video Game	317