iLRN 2017 Preface

The iLRN conference is planned by the Immersive Learning Research Network (iLRN), an international organization of developers, educators, and research professionals collaborating to develop the scientific, technical, and applied potential of immersive learning. This year's conference was the third annual meeting of reporting high-quality results in immersive learning research. Effective immersive learning experiences are created within multiple media using myriad techniques and employing a wealth of knowledge that spans many disciplines wherein immersive learning and training may be relevant. The vision of iLRN is to seek out, innovate, and share the evidence and potential for immersive learning. One way of doing this is by hosting a worldwide conference for immersive scholars from across the disciplines, beginning in 2015 in Prague, Czech Republic. These conferences are designed to support and create opportunities for ILRN members to meet in collaborative contexts and build their professional immersive learning research and development capacities, and share practical experiences in various scientific tracks and other presentation formats. But more than this, they were devised as an incubator during which iLRN members can collaboratively develop a comprehensive research and outreach agenda that encompasses the breadth and scope of the learning potentialities, affordances, and challenges of immersive learning environments.

The third annual iLRN conference was held this year, hosted at the University of Coimbra in Portugal, one of the oldest universities in the world, dating from 1290, just one century after the founding of the Portuguese nation. Situated in the heart of the historic city of Coimbra, the university is poised amidst a fusion of new and old, as newer technology corporations and non-profits vie for prominence with historic architecture and tourism attractions. It is a setting where we hope to better define "immersion" and what that means across our connected interdisciplinary focus. We hope to highlight what "immersive" learning means to a number of focused disciplinary areas. We hope to immerse ourselves in a number of designed experiences to compare and contrast what capabilities they bring – and what things they disallow or take away.

This year's special focus was "Honoring Tradition, Immersed in the Future." Set at the nexus between old and new, with ancient physical structures mixed among modern architectural marvels, this year's conference concentrated on the fusion between old and new in immersive learning. Creating immersive experiences is becoming easier every day, but doing it well so that people learn effectively is much harder. People engaged in the production of high-quality immersive learning experiences, thus, must be a specialist in one or more disciplines with the ability to appreciate and work effectively from the lens of other specialties. Some of these specialists will be from "old" professions, such as writers, teachers, thespians, attorneys, and sports professionals, while others will be from newer occupations such as computer coders, 3D graphic designers, and educational technologists. Creating effective learning

experiences using immersive technologies requires the coordination of both "old" and "new" types of special expertise and effort. Old and new must work together.

As such, this conference is focused on providing opportunities for individuals from a wide variety of areas to share their information across the fields involved with the research, development, implementation, practical experiences, and business of immersive learning. The conference format was designed to gather submissions to the main track focusing on the conference theme, while the six special tracks, workshops, and two publication outlets were planned to draw more interest from diverse communities of scholars and practitioners based on discipline, methodology, or technology type. Five stimulating keynotes from academia and research-sponsored industry complement the technical program. We showcase and discuss all of this scholarly and embodied experience through our podcast, *The Versatilist,* with our host and 2017 ILRN Finance Director, Dr. Patrick O'Shea. The podcast is one great way for us to explore the scope and depth of this exciting emerging interdisciplinary field.

Like the inaugural conference, iLRN 2017 was an important forum for immersive learning research. The call for papers resulted in a total of 76 submissions from around the world. Every submission underwent rigorous review by at least two members of the Program Committee to keep high scientific and quality standards. The editorial board decided, based on the reviewers' comments, to accept 17 full papers and four short papers for the proceedings, which is an acceptance rate of 27%. The full papers are arranged into two parts in the proceedings, the main track and the special tracks. The accepted papers' authors are from: Austria, Brazil, China, Cyprus, Finland, Germany, Greece, The Netherlands, Norway, UK, Portugal, and USA (Arkansas, Indiana, Massachusetts, Minnesota, Ohio).

We would like to thank all who contributed to the success of this conference, in particular the members of the iLRN committee (and the additional reviewers) for carefully reviewing the contributions and selecting a high-quality program. Our academic chair, Christian Guetl, did a perfect job of organizing and coordinating the conference details. Michael Gardner performed admirably as general chair, as did Anasol Peña-Rios in her role as website and communications director. We also thank all of the international chairs and board of reviewers for their support. Colin Allison did an incredible job as program chair, handling the development of a wonderful program, and Johanna Pirker and Fooad Khosmood did the same in their roles as the special tracks co-chairs. Dennis Beck prepared and organized the Springer proceedings and ensured that every submission was of high quality, spending hours interacting with authors and other editors. Thanks also to Leonel Morgado, Ana Amélia Carvalho, and João Caetano for serving as local co-chairs and coordinating all of the very important details in Coimbra along with their doctoral students. Of course, we would like to especially thank Jonathon Richter, iLRN executive director, for taking care of the local arrangements and many other aspects in the organization of the conference.

The following people performed admirably in their roles as special track organizers:

- Alexander Nussbaumer, Rob Nadolski, and Samuel Mascarenhas – "Personalization in Immersive and Game-Based Learning Environments"
- Alexandra Gago da Câmara, Helena Murteira, and Maria Leonor Botelho – "Digital Heritage and the Immersive City"

- Johanna Pirker and Foaad Khosmood – "Immersive and Engaging Educational Experiences"
- Ilona Buchem, Ralf Klamma, István Koren, Fridolin Wild, and Alla Vovk – "Wearable Technology-Enhanced Learning"
- Markos Mentzelopoulos, Daphne Economou, and Phil Trwoga – "Serious Games Using Immersive and Assistive Technologies"
- Ana Isabel Veloso and Ruth Contreras Espinosa – "Immersive Experiences in Later Age"

We hope that you enjoy reading the content of these proceedings. Browse the papers, reflect on the interdisciplinary connections and applications, contact the authors to continue discussions, and continue to advance iLRN's immersive learning agenda by becoming part of both "old" and "new" – able to apply a depth of skill to a progressively widening scope of immersive learning situations and experiences, equally at ease with technical issues as with disciplinary strategies and content.

Dennis Beck
Publications Chair
Christian Gütl
Academic Chair
Michael Gardner
General Chair

iLRN 2017 Main Conference Preface

ILRN 2017 was the third annual international conference of the Immersive Learning Network. It followed on from the inaugural conference held in Prague in July 2015 and the second conference held in Santa Barbara in June 2016.

The past 12 months saw a further increase in the availability and capabilities of devices that support augmented and virtual reality systems. The mission of iLRN is to stimulate the use of, and share knowledge about, these exciting technologies as they are applied effectively in education and learning scenarios. This requires fundamental and applied research from both single and inter-disciplinary approaches. iLRN includes but does not limit its focus to virtual and augmented worlds, learning and motivational games, educational simulations, mixed/augmented reality, related learning and teaching tools, techniques, technologies, and standards. iLRN aims to develop a comprehensive research and outreach agenda that encompasses the breadth and scope of all the learning potentialities, affordances, and challenges of immersive learning environments. To achieve this, iLRN 2017 invited scientists, practitioners, organizations, and innovators across the disciplines to explore, describe, and apply the optimal use of immersive worlds and environments for educational purposes. The conference aims to explain and demonstrate how these immersive learning environments best work using a variety of rigorous, systematic, and meaningful research methods and outreach strategies. In all, 46 papers were received for the main conference and after a rigorous reviewing process ten were selected as full papers and three as short papers for this Springer publication (28% acceptance rate). The authors of these papers come from all over the world, including Austria, Australia, Brazil, Cyprus, UK, Germany, The Netherlands, Portugal, and the USA.

These main conference papers cover a wide range of topics in some depth. Hutzler et al. use a location-aware scavenger hunt game as the basis for *enjoyable* exploratory learning; Saloko et al. seek to demonstrate the value of immersive technologies for collaborative innovation spaces; autism and life skills are targeted by Schmidt et al., who bring virtual world technologies to bear on these challenges; Coelho and Costa take the old idea of a sticker album collection and reimagine it using augmented reality in a museum space; Sheafer and Gardner report on lessons learned from a set of trials on MIRTLE: a Mixed Reality Teaching and Learning Environment, conducted at Saint Paul College, Minnesota; Greenwald et al. explore the unusual situation where users are located in the same physical small space (a room) but can only communicate via their immersive virtual reality headsets and gesture detectors; Silva et al. evaluate a CSCW protocol using the popular OpenSim VR platform for providing aircraft maintenance training; from a cultural heritage perspective, Fabola et al. find that museums can provide compelling and informative experiences that enable visitors to travel back in time with minimal interaction and relatively low cost systems; Schneider et al. analyze the effectiveness of the nonverbal communication of learners and provide them with feedback, in cases where human feedback is not available using a prototype:

Presentation Trainer; Herpich et al. advance the case for virtual laboratories in virtual worlds by describing a pilot using AVATAR for supporting experiential learning about principles of electricity; Nisiotis et al. take the concept of a Transactive Memory System and assess its utility in an immersive cyber campus for supporting collaborative and socially constructed learning.

This is a fascinating collection of papers reflecting the unbounded possibilities of immersive learning research. We hope that you will find these stimulating and encourage you to also contribute to the activities of the Immersive Learning Research Network.

Colin Allison
Main Conference Programme Chair

iLRN 2017 Special Tracks Preface

Every year, the concept of immersion becomes more and more important for various fields including digital education. Digital education brings together various disciplines and the concept of immersion adds a layer of complexity. The immersive learning research field is therefore highly interdisciplinary involving research groups from a wide range of fields and interests. The special tracks of iLRN are designed as a forum to strengthen and highlight the interdisciplinary nature of the subject. Continuing from our successful experiences at iLRN 2015 and iLRN 2016, special tracks give us the opportunity to bring together experts from a wide range of backgrounds and enable interdisciplinary research collaboration and knowledge exchange.

For iLRN 2017, the following tracks promoting emerging and innovative topics related to immersive education were offered:

- The special track "Personalization in Immersive and Game-Based Learning Environments" was chaired by Alexander Nussbaumer, Rob Nadolski, and Samuel Mascarenhas. The aim of this track was to gain insights into personalization strategies in immersive and game-based learning environments.
- In the track "Digital Heritage and the Immersive City," the track chairs Alexandra Gago da Câmara, Helena Murteira, and Maria Leonor Botelho invited participants to explore and discuss immersive representations of digital heritage studies.
- In the track "Cognitive Serious Gaming," the track chairs Markos Mentzelopoulos, Daphne Economou, Vassiliki Bouki, Aristidis Protopsaltis, and Ioannis Doumanis explored how cognitive principles can be applied to improve the training effectiveness in serious games.
- In the track "Immersive and Engaging Educational Experiences," the track chairs Johanna Pirker and Foaad Khosmood discussed how immersive and engaging educational experiences can be designed, developed, and analyzed.
- In the track "Wearable Technology-Enhanced Learning," the track chairs Ilona Buchem, Ralf Klamma, István Koren, Fridolin Wild, and Alla Vovk invited authors to present work on wearable technologies as part of immersive user experiences.
- The track "Serious Games Using Immersive and Assistive Technologies" was chaired by Markos Mentzelopoulos, Daphne Economou, and Phil Trwoga. This track aimed to explore how immersive and assistive technologies can be applied to improve the effectiveness in serious games in achieving formal or informal training.
- The aim of the track "Immersive Experiences in Later Age" chaired by Ana Isabel Veloso and Ruth Contreras Espinosa was to discuss the challenges and strategies in order to extend technology-enhanced learning to older adults.

In all, 30 submissions were received for the special tracks and ten were chosen as full papers to be published in the Springer proceedings, for an overall acceptance rate of 30%.

We would like to express our deep gratitude to all special track chairs and reviewers of the special track papers for their engagement and commitment to make the tracks an essential and integral part of the iLRN conference. These tracks brought together a variety of different research fields related to immersive learning to this conference. We cordially thank each and every person who contributed toward making these special tracks such an important part and unique experience of iLRN.

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Johanna Pirker
Foaad Khosmood
Special Track Co-chairs

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