

Yueh-Min Huang  
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Tânia Rocha (Eds.)

LNCS 13117

# Innovative Technologies and Learning

4th International Conference, ICITL 2021  
Virtual Event, November 29 – December 1, 2021  
Proceedings



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ISSN 0302-9743                      ISSN 1611-3349 (electronic)  
Lecture Notes in Computer Science  
ISBN 978-3-030-91539-1              ISBN 978-3-030-91540-7 (eBook)  
<https://doi.org/10.1007/978-3-030-91540-7>

LNCS Sublibrary: SL3 – Information Systems and Applications, incl. Internet/Web, and HCI

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# Preface

The International Conference of Innovative Technologies and Learning (ICITL), provides a platform for those who are working on educational technology to get together and exchange experiences. Benefiting from a variety of emerging innovative technologies, the e-learning environment has become highly diversified in recent years. Diversified innovative technologies have fueled the creation of advanced learning environments by adopting appropriate pedagogies. Moreover, these technologies not only facilitate learning but also actively help students reach maximized learning performances. However, due to the rapid evolution of new technologies, how to make best use of these technologies whilst still complying with effective pedagogies to create adaptive or smart learning environments remains an area of interest. Therefore, this conference series intends to provide a platform for those researchers in education, computer science, and educational technology to share experiences of effectively applying cutting-edge technologies to learning and to further spark brightening prospects. It is hoped that the findings of each work presented at the conference will enlighten relevant researchers or education practitioners to create more effective learning environments. ICITL is always ready to share the proceedings with the public.

Due to the unfolding coronavirus (COVID-19) outbreak and travel restrictions, this year's conference (ICITL 2021) was held virtually and interactively. Therefore, all accepted papers were presented in a fully virtual format, with each session held interactively in a virtual meeting room. This year we received 110 submissions from authors in 21 countries worldwide. After a rigorous double-blind review process, 59 papers were selected as full papers and two papers were selected as short papers, yielding an acceptance rate of 55%. These contributions covered the latest findings in the following areas: 1) Artificial Intelligence in Education; 2) Augmented, Virtual, and Mixed Reality in Education; 3) Computational Thinking in Education; 4) Design Frameworks and Models for Innovative Learning; 5) Education Practice Issues and Trends; 6) Educational Gamification and Game-based Learning; 7) Innovative Technologies and Pedagogies Enhanced Learning; 8) Multimedia Technology Enhanced Learning; 9) Online Course and Web-based Environments; and 10) Science, Technology, Engineering, Arts and Design, and Mathematics. Moreover, ICITL 2021 features two keynote presentations by renowned experts and scholars: Lin Lin and Matthieu J. Guitton. We are grateful for their insights on the topics of "Bridging Human Intelligence and Artificial Intelligence for Education and Future Workforce" and "Learning in a Post-COVID Era: The Challenges of Digital Inequalities".

We would like to thank the Organizing Committee for their efforts and time spent to ensure the success of the conference. We would also like to express our gratitude to the Program Committee members for their timely and helpful reviews. Last but not least, we would like to thank all the authors for their contribution in maintaining a

high-quality conference – we count on your continued support in playing a significant role in the Innovative Technologies and Learning community in the future.

November 2021

Yueh-Min Huang  
Joao Barroso  
Frode Eika Sandnes  
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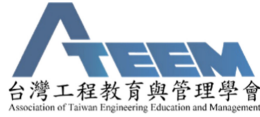


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