15th European Conference on Game Based Learning (ECGBL 2021)

Online
23 – 24 December 2021

Editor:

Panagiotis Fotaris

ISBN: 978-1-7138-3942-2

Printed from e-media with permission by:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright The Authors, (2021). All Rights Reserved. No reproduction, copy or transmission may be made without written permission from the individual authors.

Printed with permission by Curran Associates, Inc. (2022)

Review Process

Papers submitted to this conference have been double-blind peer reviewed before final acceptance to the conference. Initially, abstracts were reviewed for relevance and accessibility and successful authors were invited to submit full papers. Many thanks to the reviewers who helped ensure the quality of all the submissions.

Ethics and Publication Malpractice Policy

ACPIL adheres to a strict ethics and publication malpractice policy for all publications – details of which can be found here:

http://www.academic-conferences.org/policies/ethics-policy-for-publishing-in-the-conference-proceedings-of-academicconferences-and-publishing-international-limited/

Conference Proceedings

The Conference Proceedings is a book published with an ISBN and ISSN. The proceedings have been submitted to a number of accreditation, citation and indexing bodies including Thomson ISI Web of Science and Elsevier Scopus.

Author affiliation details in these proceedings have been reproduced as supplied by the authors themselves.

Published by Academic Conferences and Publishing International Ltd. 33 Wood Lane Sonning Common RG4 9SJ UK

Phone: 441 189 724 148 Fax: 441 189 724 691 info@academic-conferences.org

Additional copies of this publication are available from:

Curran Associates, Inc. 57 Morehouse Lane Red Hook, NY 12571 USA Phone: 845-758-0400

Fax: 845-758-2633

Email: curran@proceedings.com Web: www.proceedings.com

Contents

Paper Title	Author(s)	Page No
Preface		viii
Committee		ix
Biographies		хi
Research papers		
An Adaptation of the 'Escape Rooms' Methodology in Online Learning to Facilitate and Investigate Active Learner-led Activities and Experiences	Sylvester Arnab, Emma Eyre, Mark Noon, Sarah Kernaghan-Andrews and Dominic Mahon	1
Towards the Mapping of Learning, Playful, and Frugal Aspects for Developing 21st Century Competencies and Resilience	Sylvester Arnab, Dominic Mahon, Alex Masters, Luca Morini, Jacey-Lynn Minoi and Fitri Mohamad	14
Video Game Usage, Substance Use, and Sleep Among College Students	Justin Asbee, Danica C. Slavish, Daniel J. Taylor and Jessica R. Dietch	25
Supporting Teachers Adopting Game-based Learning in Formal Education: A Systematic Literature Review	Mohammad Assaf, Ton Spil and Guido Bruinsma	33
Integration between Learning Content and Educational Game Narrative: An Empirical Investigation of Technical Factors	Pratama Wirya Atmaja and Sugiarto Sugiarto	43
Enhancing Problem-Solving Skills with Educational Escape Rooms: a Middle School Case Study	Masiar Babazadeh and Manrico Francesco Frigerio	53
MountainQuest: Designing an Action/Adventure Game to Teach Children About Nutrition	Dmitriy Babichenko, Patrick Healy and Cynthia Danford	63
A Skill tree Method to Identify and map in-game Skills to out-of-game Contexts	Per Backlund, Patrik Erlandsson and Jimmy Andersson	72
Design Considerations for Developing a Game-Based Learning Resource for Cyber Security Education	Chitra Balakrishna	80
That Cute Creeper Just Blew Up My House: Lessons in resilience in Minecraft games	Kim Balnaves	90
Teaching History and Bringing the past back to life with Serious Games	Gavin Baxter, Thomas Hainey, Antea Savorelli, Umar Akhtar and Ralica R. Ivanova	99
Fighting Viruses Though Escape Room Design with Students	Luca Botturi and Masiar Babazadeh	108
The Effect of Collaborative Gamification in the Student's Experience in a Mathematics Course	David Antonio Buentello-Montoya	117
End-user Development of Virtual Simulations for Task Training: A Literature Review	Tina Helene Bunæs and Joakim Karlsen	124
Heutagogy as Narrative: Role-Playing Learning Design for Computer Science Teaching and Learning	Lance R. Bunt	131
BITInLine: A Serious Game to Enhance Business Information Technology and Strategy Alignment	Luuk Collou, Guido Bruinsma and Maria- Eugenia lacob	141
Towards a Quality Label for Educational Games and Serious Games	Julian Conradt, Tobias Eckert, Polona Caserman, Marcel Schaub, Regina Bruder and Stefan Göbel	151

i

Paper Title	Author(s)	Page No
Development of Mathematical Thinking through Playing Video Games	Mária Čujdíková and Peter Vankúš	160
How Insights into Entertainment Games can Improve the Design of Educational Games on Complex Societal Problems	André Czauderna, Emmanuel Guardiola, Joelle- Denise Lux and Alexandra Budke	170
Assessing Serious Games Within Purchasing and Supply Management Education: An In-Class Experiment	Vincent Delke, Wolfgang Buchholz and Holger Schiele	178
Cultural Dimension in User Experience – Mobile Games for Older Adults: A Case Study	Ryann Deloso, Anja Poberznik, Nuno Pombo, Bruno M. C. Silva and Sari Merilampi	188
StreamIT! Towards an Educational Concept Centred Around Gameplay Video Production	Natalie Denk , Barbara Göbl, Thomas Wernbacher, Suzana Jovicic and Simone Kriglstein	196
Failures in Game-Based Learning Experiences Sometimes Win	Adriana Fogel, Daniela De Sousa, Patrícia Padrão and José Azevedo	203
Integrating Game-Based Learning for Intercultural Skills Development in Higher Education	Marta Fondo and Pilar Gómez-Rey	213
Towards an Assessment Framework for Learner- Created Game Levels in Chemical Engineering Education	Sílvia Fornós and Daniel Cermak-Sassenrath	222
Design-Based Research on a Cooperative Educational VR Game About Ohm's Law	Regina Frieß, Tamara Voigt, Florian Gnadlinger, Christoph Holtmann and Martin Steinicke	233
Can Digital Games Improve Critical Information Literacy?	Sonja Gabriel	244
Serious Games Focussing on Migration: Which Political Messages do They Convey?	Sonja Gabriel	253
Application of the Octalysis Framework to Gamification Designs for the Elderly	Carolin Gellner, Ilona Buchem and Jana Müller	260
Developing Reading Skills in EFL Through Adaptive Game-based Learning	Roger Gilabert, David Israelsson, Judit Serra, Matthew Pattemore, Sara Feijoo and Joan Castellví	268
XR Maths: Designing a Collaborative Extended Realities Lab for Teaching Mathematics	Marco Gilardi, Thomas Hainey, Andisheh Bakhshi, Cristina Rodriguez and Alan Walker	277
Do Games Reduce Maths Anxiety? A Review of the Current Literature	Pierpaolo Dondio, Flavia H. Santos, Viacheslav Gusev and Mariana Rocha	287
Development of an Instrument to Analyse Gameplay Features Promoting Complex Problem-Solving Conditions	Dimitar Gyaurov, Carlo Fabricatore and Andrea Bottino	296
Playing and Reflecting Games: The Production of Gamified Learning Artefacts in Teacher Education	Daniel Handle-Pfeiffer and Christoph Winter	306
Games, Dialogue and Learning: Exploring Research Perspectives	Thorkild Hanghøj, Kenneth Silseth and Hans Christian Arnseth	315

Paper Title	Author(s)	Page No
How to Model a Visual Novel Game to Train and Identify Players' Soft Skills?	Jérôme Hernandez, Mathieu Muratet, Matthis Pierotti and Thibault Carron	322
Methods for Design 'with' Movement: A Systematic Literature Review	Maximilian Hille, Nadia Boujari, Kristina Bilkova, Tobias Ohm Søby and Md Saifuddin Khalid	331
Systematic Extension of a Simulation game for Digitalised Production	Henry Himmelstoß, Simon Rapp, Ozan Yesilyurt and Andreas Bildstein	342
Evolving and Improving a Board Game to Enhance Business Acumen	Suzaan Hughes	350
You can't Escape Learning, but Maybe you can get out of the room! Game-based Learning for Programming Education	Niklas Humble, Peter Mozelius and Lisa Sällvin	359
Designing an Educational Board Game "Story of Court" for Training Chinese Reading Comprehension: Analysis of Learning Effects, flow, Acceptance and Anxiety	Jyun-Yi Ji, Yu-Chi Chen, Chih-Chen Kuo and Huei-Tse Hou	368
Comparing Design-Based and Agile Methodologies in Educational Game Development	Osvaldo Jiménez and Dennis Ramirez	377
Privacy Awareness by Online Co-Design: Investigating Reflection and Learning Qualities of Card-Based Educational Game Creation	Patrick Jost	385
'Dangerous Zone': Games Caught Between Education and Indoctrination	Michal Kabát and Juraj Kovalčík	394
Smart Escape Rooms for Cultural Heritage: A Systematic Review	Zoi Karageorgiou, Konstantinos Michalakis, Markos Konstantakis, Georgios Alexandridis and George Caridakis	402
Serious Games in Science Education: A Systematic Mapping	Akif Quddus Khan	410
Gamification of Strategic Thinking: A COTS Boardgame for Learning Scrum, Strategy Development and Strategy Implementation	Thorsten Kodalle, Mark Schmidt, Will Thomas and Maren Metz	417
Game-Based Learning and Eye Tracking: Approaches to Integrating gaze data into Learning Assessment	Maria Koutroumani and Maria Rigou	426
Universal Sprint Game That Teaches the Basics of Financial Literacy	Ekaterina Kubina, Marina Bareicheva and Natalia Stepanova	435
STEMadium: Learning STEM From a Mobile Game Using the Science of Baseball	Tamara Kuhn and Jill Denner	443
The Development and Preliminary Evaluation of a Chinese Painting and Calligraphy Board Game with Situated Learning	Chih-Chen Kuo, Ying-Sang Fang and Huei-Tse Hou	452
Thinking Critically About Video Games: A Curriculum Construction Study	Evgeniya Kuznetsova, Jennifer Jenson and Danielle Kim	458
Run and Solve the Case! Case Studies With Game- Based Learning	Sandra Miranda Leal	465
Gamified Escape Room Experience for Simulating Team Building Using Deep Reinforcement Learning	Georgios Liapis, Aristotelis Lazaridis and Ioannis Vlahavas	472

Paper Title	Author(s)	Page No
Using Multimodal Learning Analytics to Explore Collaboration in a Sustainability Co-Located Tabletop Game	María Ximena López, Francesco Strada, Andrea Bottino and Carlo Fabricatore	480
Insights from Design Processes Used in Developing Exergames	Alexander Hvidbjerg Kjær Lund, Amalie Finnemannn Sørensen, Lars Elbæk and Maximus D. Kaos	488
CumbraeCraft: A Virtual Environment for Teaching Cultural Heritage to Primary Schoolchildren	Kayleigh MacLeod, Andrew J. Reid, Iain Donald and Kasia Smith	497
Quick and Dirty Group Testing of a Mobile app for Educators Teaching Digital Literacy and Production	Gunver Majgaard	507
Some Killer Feedback: A Case Study on Volunteering as Playtesters and Player Typologies	Joachim Majors and Matilda Ståhl	514
Can you Escape from Dr. Tom Cat's Lab? Educational Escape Rooms with Scientists, Riddles and Serious Games as Learning Tools	Christos Malliarakis, Olga Shabalina and Peter Mozelius	523
Promoting Environmental Education with Escape Room Activities: Critical Factors for Implementation	Gisela Mello, Jessica Reuter, Marta Ferreira Dias and Marlene Amorim	533
VR is Very Relevant 4 kids: Business Modeling for Virtual Reality In Healthcare	Arian Merzaie, Ton Spil, Jasmijn Franke and Monique Tabak	342
Relationship Between Spatial Reasoning Skills and Digital Puzzle Games	Iolie Nicolaidou, George Chrysanthou, Marita Georgiou, Christos Savvides and Stavrini Toulekki	551
Computer Science Unplugged: Developing and Evaluating a "Traveling Salesperson Problem" Board Game	Mareike Nutz and Luzia Leifheit	559
Source Analysis of Wikipedia Articles About Indie Games with Educational Possibilities	Jorge Oceja and Ángel Obregón-Sierra	567
Game-Based Learning Mobile-App for Teaching the Binary Numeral System	Lee-Yeng Ong, Meng-Chew Leow and Chin- Keong Tan	577
Using Kahoot! to Enhance the Motivation of Undergraduate Tourism Students in Mathematics Classes: A Case Study	Sónia Pais and Andreia Hall	589
Toward a Successful Badge Design in Gamified e- Learning: A Literature Review	Adam Palmquist and Izabella Jedel	596
"Face-to-Face" or Sim-to-Sim: Pros and cons Regarding Group Work Using a Games-Based Environment	Ole Jørgen S. Ranglund, Hanne Haave, Synnøve Arntzen and Tone Vold	604
An Open Workshop Enabling Art Students and Educators to Collaboratively Construct Multiuser Worlds	Manthos Santorineos, Stavroula Zoi and Konstantina Vetsiou	610
Learners' User Experience Assessment of a Serious Game for Social Innovation Education	Antonia Schorer and Aristidis Protopsaltis	620
Evaluating Game and Learning Mechanics Separately: A Practical Approach to Evidence-based Serious Game Development	Anna Seidel, Franziska Weidle and Claudia Börner	629

Paper Title	Author(s)	Page No
A Systematic Review of Using Reflective Design Features in Game-Based Learning	Anjuman Shaheen, Panagiotis Fotaris and Sanaz Fallahkhair	638
Using Dilemmas to Make Important Decisions: Analyzing Situations Based on the Covid Pandemic	Daria Shalina, Natalia Stepanova, Viola Larionova, Azeddine Bouziane, Nana Incirveli and Ken Brown	646
GBL for Psychological Intervention Related Skills: What Challenges? What Paths?	Carla Sousa, Micaela Fonseca, Shivani Mansuklal, Jéssica Carvalho, Diogo Silva, Pedro Neves, Filipe Luz, Ágata Salvador, Leonor Costa, Jorge Oliveira and Pedro Gamito	654
The Science Behind the Art of Engaging: Support in Games and Coding	Bernadette Spieler	663
Prototypical Implementation of an Applied Game with a Game-Based Learning Framework	Ramona Srbecky, Manfred Krapf, Benjamin Wallenborn, Matthias Then and Matthias Hemmje	671
Realization of a Framework for Game-based Learning Units Using a Unity Environment	Ramona Srbecky, Manfred Krapf, Benjamin Wallenborn, Matthias Then and Matthias Hemmje	680
Paper-based vs. Digital Prototyping: How to Evaluate Serious Game Concepts at Different Stages of Development	Antonia Stagge and Cornelia Schade	690
Gamification of the Middle Ages: Educational Dimension of User Modifications of "Total War: Medieval II"	Anton Sukhov	698
Investigating the Effects of Social Gameplay Elements in Gamifying Online Classes.	Chin Ike Tan, Choon Yee Wong, Aidora Abdullah and Julian Eng Kim Lee	707
The Joy of Rediscovering Chess: The Perspectives of Dialogic Thinking in Chess	Malolaprasath Thittanimuttam Sundaramadhavan, Luis Blasco De la Cruz, Astrid Barbier, Sharon Whatley and Mustaffa Megrahi	716
Learning Indoor Navigation Skills: A Mobile Game for People with Intellectual Disabilities	Inga Volosnikova, Olga Shabalina, Aleksandr Davtian and David C Moffat	725
Toward a Game-Based Dialogical Pedagogy: Insights from Massively Multiplayer Online Role-Playing Games	Shangjun Wang, Sojen Pradhan and Karlene Cousins	735
Recommendations for Learning Through Educational Game Design: A Systematic Literature Review	Charlotte Lærke Weitze	743
Strategic Sustainability by Serious Gaming: A Case Study of STRASUS	Ningna Xie and Raphael Heereman von Zuydtwyck	753
The Road to Al Literacy Education: From Pedagogical Needs to Tangible Game Design	Marvin Zammit, Iro Voulgari, Antonios Liapis and Georgios Yannakakis	763
Development and Evaluation of an Educational Board Game "118 Job Bank" for Human Resource Training Courses	Pei -Ying Zuo, Ying-Sang Fang, Chih-Chen Kuo, Hsin-Ta Lin and Huei-Tse Hou	772
Phd Research Papers		781
Teachers' Contemplation Towards Selecting and Evaluating Games for Classroom	Mifrah Ahmad	783

Paper Title	Author(s)	Page No
Interactive Storytelling Experience for Museums in the era of COVID-19	Saif Alatrash, Sylvester Arnab and Kaja Antlej	793
Identifying the Lack of Immersive Games in Higher Level Mathematics Game-based Learning	Evgenia Anagnostopoulou	801
Teachers Designing Lessons with a Digital Sandbox Game: The Case of Minecraft Education Edition	David Bar-El and Kathryn Ringland	809
Exploring the Impact of Perspective-taking Game Design Techniques in a Different Context	Henrique Gil, Mike Mannion, Caroline Parker and Romana Ramzan	817
Single-Player Digital Games: Hegemonical, Dialogical, or Critical Agents in Identity Formation	Mike Hyslop Graham	825
Didactic Planning of VR Alcohol Resistance Training tool for Adolescents	Patricia Bianca Lyk and Gunver Majgaard	832
Facing your fears: Design of a VR tool for Usage Within Exposure Therapy for Patients with Social Anxiety Disorders Combined with Selected Game-Based Elements	Asge Frederik Matthiesen and Lasse Juel Larsen	842
Using Game Based Learning Elements in Practice Enterprises for Entrepreneurial Education	Mihaela Moca	852
Bridging Emotional Design and Serious Games: Towards Affective Learning Design Patterns	Gabriel C. Natucci and Marcos A. F. Borges	861
Improving a new Design tool to Inform Serious Game Behaviour Change Interventions	Karen Shanks, Mike Mannion, Karen Thomson, Julie Campbell and David Farrell	870
"This is My Story": A Serious Game for Independent Living Skills in Special Education	Stavros Tsikinas and Stelios Xinogalos	878
Masters Research Paper		885
Online Design Facilitation During COVID-19: Recommendations for Future Virtual Sports Innovation Camps	Philip Wolfgang, Lærke S. Rasmussen, Johannes DiBiaso and Lars Elbæk	887
Work In Progress Papers		897
Gamifying Reading and Writing in Collaborative EFL Primary Education	Marta Fortunato, António Moreira and Ana Raquel Simões	899
Introducing Gamification in Introductory Programming Courses	Alexander Hofer and Iris Groher	902
The Crucial Role of Participation in the Development of Game-Based Learning	Thea Nieland, Miriam Burfeind, Charlotte Urra and Kai-Christoph Hamborg	906
Schoolers and Scholars: A Project Focusing on RPG in Elementary Education	Eduardo Nunes and Mário Rui Cruz	910
A Serious Game to Anticipate Handwriting Difficulties Screening Through Visual Perception Assessment	Chiara Piazzalunga, Linda Greta Dui, Cristiano Termine, Marisa Bortolozzo, Simona Ferrante and Matteo Matteucci	914
Learning Glucose Metabolism Through "Sugar Scramble": A Digital Game-Based Approach	Colleen Tang Poy, Stavroula Andreopoulos, Sian Patterson, Jodie Jenkinson and Derek Pat-Shing Ng	919

Paper Title	Author(s)	Page No
Toward the Implementation of Escape Room Games in an Educational Context	Barbara Sabitzer, Iris Groher, Corinna Hörmann and Alexander Hofer	923
Digital Games for Acquiring Everyday life Skills for Students with Intellectual Disabilities	Kristian Stancin, Natasa Hoic-Bozic and Martina Holenko Dlab	927
Development and Assessment of a Card Game for Learning Ionic Compound Solubility	Elaine Tsai	931
Design of an Educational Game to Foster Self- regulated Learning	Nathalie Zetzmann, Tim Moritz Böhm and Franziska Perels	937
Late submission		943
Starflyer: An edu-larp Project for Ethic and Math teaching and Learning	Andrea Maragliano, Josef Kundràt, Francesca Morselli and Elisabetta Robotti	945