Proceedings of the 5th European Conference on Games Based Learning

5th European Conference on Games Based Learning
The National and Kapodistrian University of Athens, Greece
20-21 October 2011

Papers have been double-blind peer reviewed before final submission to the conference. Initially, paper abstracts were read and selected by the conference panel for submission as possible papers for the conference.

Many thanks to the reviewers who helped ensure the quality of the full papers.

These Conference Proceeding have been submitted to the Thomson ISI for indexing.

Further copies of this book can be purchased from http://www.academic-bookshop.com

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Preface

These proceedings represent the work of researchers participating in the 5th European Conference on Games-Based Learning, which is being hosted this year by the National and Kapodistrian University of Athens, Greece, with the co-operation of the Hellenic American Union.

The conference will be opened with a keynote from Professor Sara de Freitas, Serious Games Institute, University of Coventry, UK on the topic of "The Gamification of Life: Building social communities through games". The keynote address on the second day is delivered by Professor Nikolaos Avouris, ITLab Human-Computer Interaction Group, University of Patras, Greece.

The ECGBL Conference constitutes a valuable platform for individuals to present their research findings, display their work in progress and discuss conceptual advances in many different branches of games-based learning. At the same time, it provides an important opportunity for members of the GBL community to come together with peers, share knowledge and exchange ideas.

ECGBL has evolved and developed over the past five years, and the range of papers accepted in this year's conference ensures an interesting two-day event.

Following an initial submission of 165 abstracts that have undergone a double blind peer review process, 78 research papers, 8 PhD research papers, 10 work-in-progress papers and 2 non-academic papers are published in the ECGBL 2011 Conference Proceedings, representing research results from Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Czech Republic, Denmark, Estonia, Finland, France, FYROM, Germany, Greece, India, Ireland, Italy, Oman, Poland, Romania, Russia, Singapore, Spain, Sweden, Taiwan, The Netherlands, UK and the USA.

We hope that you have an enjoyable conference.

Assistant Prof. Dimitris Gouscos   Professor Michalis Meimaris
ECGBL 2011 Programme Chair   ECGBL 2011 Conference Chair

October 2011

Biographies of Conference Chairs, Programme Chairs and Keynote Speakers

Conference Director
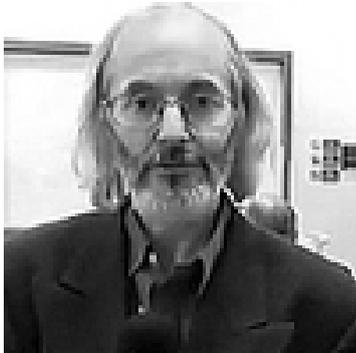
Professor Thomas M Connolly is the original instigator of this conference in 2007. Thomas is a Professor in the School of Computing at the University of the West of Scotland, having managed the Department of Computing and Information Systems for several years. Thomas worked for over 15 years in industry as a Manager and Technical Director in international software houses before entering academia. His specialisms are games-based learning, online learning and database systems. He has developed three fully online MSc programmes and developed and leads the undergraduate BSc Computer Games Technology programme. He is co-author of the highly successful academic textbooks Database Systems (now in its 4th edition) and Database Solutions (in its 2nd edition). He is a reviewer for several international journals and has been on the committee for various international conferences. He is a member of CPHC (Council of Professors and Heads of Computing) and member of the Higher Education Academy.

Conference Chair

Professor Michael Meimaris is Director of the New Technologies Laboratory in Communication, Education and the Mass Media in Athens. Professor Meimaris has authored a large number of scientific articles, studies and books. His interests focus on the introduction of New Technologies to Communication, Education and the Media, Graphic Design and Computer Animation, the New Technological Communication Environment and the design of its structure, Multimedia, Open and Distance Learning, and the education of trainers in the New Technologies field. He is the Scientist Responsible for programs involving the conception, the design and creation of New Technologies applications, as well as programs focusing on adult education. He has organized a number of International Scientific Conferences and Seminars for the European Union and is a member of the most significant Scientific Committees in his field of expertise.
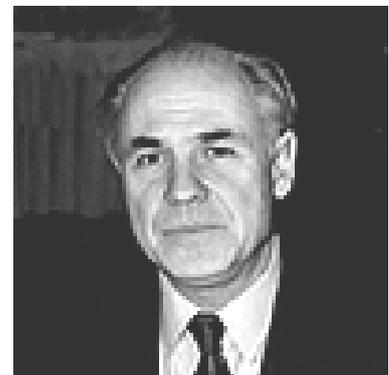
Programme Director

Dr Mark Stansfield is the founding programme chair for ECGBL. Mark is a Senior Lecturer in the School of Computing at the University of West of Scotland. He has a PhD in Information Systems and has written and co-written more than 70 refereed papers in areas relating to e-Learning, games-based e-Learning, information systems and e-Business. Journals in which papers have been published include the European Journal of Information Systems, Systems Practice and Action Research, the Journal of Further and Higher Education, the Journal of Electronic Commerce Research, the Journal of IT Education, and Computers and Education. Mark also serves on the editorial boards of several international journals that include the International Journal of Information Management, Journal of Information Systems Education, ALT-J and the Journal of IT Education. Mark was appointed Member of the International Association of Science and Technology for Development (IASTED) Technical Committee on Education for the term 2005-2008 and is a Registered Practitioner of the Higher Education Academy in the UK. He has presented papers at international conferences for over 15 years and has won Best Paper Awards at a number of conferences including the UK Systems Society Conference in 1993 and the Informing Science and IT Education Conferences in 2003 and 2006.

Programme Chair

Dr. Dimitris Gouscos is a Lecturer with the Faculty of Communication and Media Studies of the University of Athens and research fellow with the Laboratory of New Technologies in Communication, Education and the Mass Media, where he contributes to the co-ordination of two research groups on Digital and Reflective Game-Based Learning and Electronic Governance, Digital Deliberation and Civic Media.

Keynote Speakers

Professor Sara de Freitas is Director of Research and Professor of Virtual Environments at the Serious Games Institute at the University of Coventry where she leads an applied research team working closely with industry. Sara holds a visiting fellowship at the University of London, is elected chair of the Lab Group and is a Fellow of the Royal Society of Arts. She is also the Scientific Coordinator for the EU GALA network of excellence in Serious Games. Voted the Most Influential Woman in Technology 2009 and 2010 by US Fast Company, Sara

also chairs the IEEE Serious Games and Virtual Worlds conferences (VS-Games) and is a regular speaker at international conferences. Sara currently holds 12 projects, funded through European, regional and national agencies. She sits on 31 programme committees for journals, books and conferences, has chaired 6 international conferences and has given over 80 presentations and lectures in the UK and abroad. Her research includes e-learning innovation, multimodal interfaces, experience design and perceptual modelling in games and virtual worlds. Sara publishes widely with over 90 publications (reports, journal articles, conference papers and books) in the areas of: pedagogy and e-learning, change management and serious games and virtual worlds for supporting training and learning. Her latest books: Rethinking Learning for a Digital Age (edited with R. Sharpe and H. Beetham) is published by Routledge and Digital Games and Learning (edited with P. Maharg) is published by Continuum Press

Dr Nikolaos Avouris is Professor of Human-Computer Interaction at the University of Patras, Greece and Head of the HCI group (hci.edu.gr). His research interests include Software Technology in relation to Industrial, Educational and Environmental Applications. He has a Special interest and experience in the areas of Human-Computer Interaction, Interactive Systems Design, Distributed Intelligent Systems, machine Learning, application of Knowledge -based techniques in Computer-Supported Collaborative Learning (CSCL), in the educational, industrial and environmental fields. He has been a key researcher in many national and international funded research projects in the area of IST, ESPRIT, Environment, PENED, YPER etc. He has served as Editor of two international volumes and is the author of over 100 scientific papers and technical reports in the above research areas. Professional memberships include Member of the Technical Chamber of Greece (1979), Greek Electrical Engineers Association (1979), Greek Computer Society (1992), IEEE Computer Society (1995), founding member of the Greek Artificial Intelligence Association (EETN) and Hellenic Associaton of Computer and Communication Technonologies in Education.

Mini Track Chairs

Dr Patrick Felicia PhD, is a lecturer, course leader and researcher at Waterford Institute of Technology, where he teaches and supervises postgraduate students. He obtained his MSc in Multimedia Technology in 2003 and PhD in Computer Science in 2009 from University College Cork, Ireland. His research interests and

expertise are mainly in Game-Based Learning, Multimedia, Educational Psychology and Instructional Design. He has served on program committees for international Game-Based Learning and Technology-Enhanced Learning conferences. He is editor-in-chief of the International Journal of Game-Based Learning (IJGBL), and is also editor of the Handbook of Research on Improving Learning and Motivation through Educational Games: Multidisciplinary Approaches, published by IGI.

Dr. Stefan Göbel holds a PhD in computer science from The Technical University of Darmstadt and has long-term experience in Graphic Information Systems, Interactive Digital Storytelling, Edutainment applications and Serious Games. After five years work as researcher at Fraunhofer Institute for Computer Graphics, from 2002 to 2008 he was heading the Digital Storytelling group at the Computer Graphics Center in Darmstadt. In late 2008 he moved to The Technical University of Darmstadt and is heading the prospering Serious Gaming group at the Multimedia Communications Lab. Dr. Göbel is the author of numerous papers and member of different program committees such as ACM Multimedia, ICME, Edutainment, Foundations on Digital Games, Serious Games Conference and serves as jury member of the Serious Games Award.

Dr Thomas Hainey is a Researcher/Lecturer of Serious Games and Game-based Learning in the School of Computing at the University of the West of Scotland. His specialties include evaluation of GBL applications and analysis and generation of empirical evidence; he has numerous publications in this area.

Crystle Martin is a doctoral student in Curriculum and Instruction's Educational Communications and Technology at the University of Wisconsin – Madison, with a Minor in Library and Information Studies and an advisee of Constance Steinkuehler, as well as a member of her research team. In Crystle's research, she focuses on the use and development of information literacy skills within massively multiplayer online games and their information communities. She holds a MLS from Wayne State University, and a BA in English Literature and a BA in Classics from Michigan State University.

Arnold Martin originally from Flint Michigan, attended college at Wayne State University in Detroit Michigan. Arnold is an artist and designer and most recently earned his MFA in Studio Art from the University of Wisconsin – Madison in the spring of 2011. His work is primarily three-dimensional, sculptural, and physical; though his process is a hybrid of digital technology and old-fashioned shop techniques. Using digital design tools and a variety of materials and processes he works to create fantastical, self-contradictory and yet subtly plausible objects which can be both enigmatic and utterly self-conscious in their construction.

Alex Moseley is an Educational Designer at the University of Leicester, where he has had long experience as both practitioner and researcher of course design and development for higher education; and was recently awarded the title of University Teaching Fellow. He has particular interests in online and distance education, student engagement, and provision of effective research skills and student induction. His principle research area is in game-based learning, and he has suggested key features of online immersive games which can be transferred to higher education to ensure high engagement and community development.

Viktor Wendel received his degree in Computer Science from the Julius-Maximilians-University of Würzburg in 2009. Since November 2009, he is working as a research assistant at the Multimedia Communications Lab (KOM) at the Technical University of Darmstadt. His research topics are Game Mastering in Multiplayer Serious Games, Collaborative Learning, and Serious Games. Further, he is an editor for ACM SIGMM Records

Dr Nicola Whitton is a Research Fellow at Manchester Metropolitan University, specializing in the innovative use of learning technologies in Higher Education. Her particular interest is in the design and use of computer games with adult learners and she is the authors of Digital Games for Learning, a practical guide to educational game development.

Biographies of contributing authors (in alphabetical order)

Aishah Abdul Razak is a second year PhD student in the School of Computing at the University of the West of Scotland. Her research focuses on the use of Digital Games-Based Learning (DGBL) technologies in primary schools across Scotland within the Curriculum for Excellence(CfE).

Matthew Bates is a PhD candidate at Nottingham Trent University in the UK. His research has worked with secondary schools, library services and local probation services to investigate participatory design methods to facilitate students creating their own serious games.

Michael Bedek graduated from the University of Graz in 2009 in psychology. Since then, he has been working at the Knowledge Management Institute of the Graz University of Technology. Research interests are in cognitive science, mathematical modelling of cognitive processes, in particular the application of lattice theory and algebraic structures on competence assessment and development.

Andrea Benassi Instructional Designer at ANSAS – National Agency for the Support of the School Authonomy - located in Florence, Italy. He is currently running research activities on multi user virtual environments among which the SecondLearning project, aiming to discover new teaching approaches by the adoption of user-generated 3D immersive worlds.

Bani Bhattacharya is the Head of the Department at the Centre for Educational Technology, Indian Institute of Technology, Kharagpur, India. Her research areas include technology-enhanced learning, instructional design, distance education, evaluation in teaching-learning. She currently leads research for ongoing projects on technology-enhanced learning and pedagogy in higher education.

Dimitar Bogatinov is a Head of section for Advanced e-learning technologies and simulation support in military education, in the Military academy - gen Mihailo Apostolski - Skopje (Macedonia). Dimitar Bogatinov has a Master degree in Computer science from the Faculty of Electrotechnics, Skopje.

Boyan Bontchev: obtained MSc degree in Computer Science (1988) at TU-Sofia and PhD degree at Bulgarian Academy of Sciences (1993). Dr. Bontchev followed a career of software engineer and consultant in Portugal, Spain, Italy and Bulgaria, and since 2004 is Associate Professor in Software Engineering at Sofia University. Author of more than 80 scientific publications.

Natasha Boskic works as an Educational Technology Manager in the Faculty of Education at The University of British Columbia, Vancouver, Canada. Her Ph.D. is in Language and Literacy Education with a focus on narratives and immersive gameworlds as spaces for social and personal change.

Jeroen Bourgonjon is an FWO-research fellow whose main research interest is video games as a form of and in education. He focuses on the research of the meanings (rhetorical) and effects (statistically) of commercial video games in education. He has published before in journals as Computers & Education and Digital Creativity.

Per Backlund has a background in the fields of teaching, cognitive science, and information systems development. He holds a PhD in information systems from Stockholm University in 2004. His research interests are in serious games and game-based learning. He is currently managing the InGaMe Lab research group at the University of Skövde.

Thomas Bröker is a Researcher- chair of building physics, Bauhaus-Universität Weimar. Helped develop and implement eLearning Bauphysik, a further education programme and masters course in building physics. Background in architecture and worked/lectured for several years on conjunction of architecture/civil engineering. Research aims at development of learning scenarios to mediate the complex scientific and planning coherences in civil engineering and ways to unitize their implementation.

Carsten Busch earned his Phd at the TU-Berlin. He taught at a variety of Universities including the European Business School Oestrich-Winkel and the Academy of National Economy and Public Administration (Moscow). He currently teaches in Media Informatics at the HTW-Berlin and heads the HTW gameslab. He founded and leads the „Institute für Markenkommunikation".

Manuela Cantoia is a Professor of General Psychology and coordinator of training activities of SPAEE (Service for Learning and Education Psychology) at the Catholic University in Milan. Her interest of research deals with learning, metacognition and new technologies. Trainer in courses for school teachers and parents.

Bruno Capevila Ibáñez graduated from the Polytechnic UPC University in Barcelona with the speciality of Software Engineering.He has a master degree from the UPMC in Human Learning Systems. This is the second year of his thesis in the domain of serious games within a partnership between the LIP6 and KTM-Advance company.

George Caridakis has a degree in Informatics and Telecommunications, University of Athens (2004). PhD in "Affective Analysis in Human Computer Interaction", School of Electrical and Computer Engineering, National Technical University of Athens (2009). Currently Adjunct Lecturer, Department of Computer Science and Biomedical Informatics, University of Central Greece and Senior Researcher at Interaction Systems, Content and Interaction Laboratory (ISCIL) of NTUA.

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Nathalie Charlier is a Lecturer at Faculty of Pharmaceutical Sciences and co-ordinator of the Teacher Training in Health Science Education at the Katholieke Universiteit Leuven, Belgium. She Obtained her BSc and MSc in Pharmaceutical Sciences in 1999 and PhD in Medical Sciences in 2003. Research interests are (i) game-based learning in health science education, (ii) the use of new technologies in education and (ii) health promotion and education in low-income countries.

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Evelyn Cloosen is a researcher at the PHL University College, Belgium. Her current areas of research include ICT in higher education and game-based learning in primary and secondary education. She holds a MA in

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Mauro Cozzolino is assistant professor of General Psychology at the University of Salerno (IT). He coordinated research units in several EU-funded projects.His research interests include bodily communication, mind body intregration, psycosocial genomic, Social cognition, neuroscience.

Basel Dayyani,PhD, worked in software engineering industry for over 25 years in Silicon Valley, California, USA and Dubai, UAE. Worked in different engineering and business fields and currently is director of Center of Applied Software Technology and associate professor at American University in Dubai. Research interest is in design and development of knowledge driven multiplayer computer games.

Frederik De Grove is a junior researcher and PhD candidate at the research group for Media and ICT at Ghent University (IBBT-MICT). His research focuses on video game experience and digital game-based learning.

Dr Ioannis Deliyannis is a Lecturer at the Department of Audiovisual Arts, Ionian University, Corfu; Greece.His research interests include the application of Interactive Multimedia in the area of AudioVisual Arts. He is the author of a series of journal and conference publications in the above fields, and a series of books targeting the experimental, creative and educational aspects of the technologies involved.

Mircea Dragu Studies summarized: 1973- Faculty of Physical Education and Sports, Galati, Romania: 1999- doctoral studies, the National Institute of Physical Education and Sports, Kishinew, Moldova. Current place of work: The Faculty of Sports and Physical Education Galati, the Department of Movement Games. Publications: 9 books, 95 conference papers.

Jeffrey Earp is a research technician at ITD-CNR with experience in TEL-oriented projects at Italian and European levels. His fields of activity have included CALL, educational software, teacher training in ICT, narrative learning environments, accessibility, pedagogical planning, digital resources for education. He currently works in the EC "Games and Learning Alliance" Network of Excellence (GaLA).

Carlo Fabricatore is a computer scientist, game scholar and professional game developer. He is currently Senior Lecturer in Computer Games Design & Development at the University of Worcester (UK). His research focuses on complex systems, game-based learning and project management. In the game industry he has collaborated with Nintendo, Sony and Atari, amongst others.

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Cristina Gafu is a Ph.D. lecturer, specialized in ethnology and folklore, working in the Philology Department of the University of Ploiesti. Her interests include the storytelling phenomenon, contemporary narratives, having published more than 15 studies and two books dealing mainly with narratives in the urban environment and aspects of the urban ethnologic research.

Joseph Heili is presently Head of the 1st year program of ESC Chambery Business School. His research interests are ERPs and more broadly social aspects of information systems. He has published different chapters in books and a few articles pertaining to these themes. He regularly participates to international conferences and presented there more than 20 communications.

Barry John Patrick Herbert is currently a PhD student within the Faculty of Computing and Engineering at the University of Ulster. He attained a BSc Hons in Computing at the same university and has continued straight into the PhD programme to study the area of Adaptive Virtual Learning Environments.

Michael Herzog Professor of business management and IT at Magdeburg-Stendal University of Applied Sciences. Research is concentrated on multimedia, mobile systems, RFID-technology, content management, and e-Learning. Founded several internationally operating IT-enterprises in media technology and software development. Holds PhD in information systems and master's degree in computer science from Technische Universität, Berlin.

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Jule Hildmann Higher Degree in Special Education, Outdoor Guide and Trainer in Experiential Education with various qualifications in outdoor sports, counseling and crisis intervention. Facilitator and Train-the-Trainer at the Centre for Experiential Education Volkersberg (Germany). PhD of the Ludwigs-Maximilians-University, Munich (Germany).

Jason Holdsworth is a Lecturer at the Cairns Campus of James Cook University Australia. He received a Ph.D. and a BSc. in Computer Science from the School of Computer Science at James Cook University. His research interests include mobile technology, e-learning, and theoretical computer science.

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Ioanna (Jo) Iacovides is a third year PhD student looking at digital games and learning within the Institute of Educational Technology at the Open University, UK. Her main interests concern how different methods can be used to explore the relationship between involvement and informal learning in games.

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Azilawati Jamaludin is a PhD student and Research Associate in the Learning Sciences Lab at the National Institute of Education, Nanyang Technological University, Singapore. Her research focuses on embodied subjectivities, across offline and online 3D immersive spaces, in relation to identity *becoming* and coherent construal of *self*.

Matthew Jewell is the Game Designer for Rosetta Stone, where he has worked on over twenty shipping titles. He earned an M.F.A from The School of the Art Institute of Chicago and his creative work has resulted in several grants, publications and gallery exhibitions. He enjoys oulipien fiction and pataphysical cartography.

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Michael Kickmeier-Rust holds a PhD in cognitive psychology and he is an experienced project manager and software developer. His research and development activities focus primarily on technology-enhanced learning, in particular intelligent, adaptive educational systems and human-computer

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Colin Lemmon is a lecturer at James Cook University. He received a Ph.D. in information technology from the Faculty of Law, Business and Creative Arts, School of Business, at James Cook University, Australia. His research interests include serious games and geographic routing.

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Dennis Maciuszek holds a German Dipl.-Inform. and a Swedish Lic. in Computer Science (minor: Psychology), as well as an M.A. degree in Media. He was previously employed as a researcher at Linköpings universitet, Sweden. Currently, he is a PhD student at the University of Rostock, Germany, working in the area of Game-based Learning.

Sophia Mandouvalou studied Developmental Psychology, Educational Technology and Film Direction. Author of literature for children and adults (awards, translations). Scriptwriter of many programmes for Educational

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Dionissios Manessis holds a M.Sc. in ICT for education, from the University of Athens, Greece. He is now a Ph.D. student at the department of Early Childhood Education of the University of Athens. His research interests include the use of digital games in Early Childhood Education and students' attitudes towards Statistics.

Ivar Männamaa has background in psychology, currently he is PhD student at the Tartu University. Besides that he is teaching units on Experiential learning and Gaming at the Viljandi Academy of Culture, Estonia. He seems to like educational metaphoric simulations, which have simple forms and rich contents.

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Vittorio Marone is a doctoral researcher in education at the University of Padua, Italy. He is a member of SIREM (Italian Research Society on Media and Education) and DiGRA (Digital Games Research Association). He is the author of the book "La Quotidianità dell'Assurdo" ("The Everyday Absurd", 2010), on the influence of cinema in post-totalitarian countries.

Jean-Charles Marty is an Associate professor University of Savoie (France). Leads "Traces and Observation" group at SysCom laboratory. Research interests in observation of collaborative activities, through traces of these activities. Results of research applied to Technology Enhanced Learning, particularly to learning game environments. Participates in several projects in this field (Learning Adventure, Learning Games Factory, Serious Lab for Innovation, Pegase). Currently organizing international school on Game-Based Learning (June 2011).

Florian Mehm is a member of the Serious Games group of the Multimedia Communications Lab (KOM) of Technical University of Darmstadt. His research areas include authoring systems for storytelling-based Digital Educational games and serious games, personalization and adaptation in games and technologies for games and edutainment applications.

Javier Melero is a Ph.D. student in the Interactive Technologies Group (GTI) at the Universitat Pompeu Fabra (UPF), Barcelona, Spain. He received his degree in Computer Science (2008) and master in Information and Communication Technologies (2009) from the UPF. His main research focus is about modelling the support of scaffolding in customizable puzzle-based learning games.

Hélène Michel is presently Head of Research & Academic Director of ESC Chambery Business School. She obtained the PhD. Advisor diploma (Habilitation à Diriger des Recherches) in 2009. She coordinates research projects dealing with Information Technologies especially in relation with Serious Games.. She also develops academic innovation in relation with Tourism Management

Constantinos Mourlas is an Assistant Professor in the Department of Communication and Media Studies, National and Kapodistrian University of Athens since 2002. His current main research interest is the design and the development of personalized environments in e-learning and digital games, that provide adaptive and personalized context to the users according to their needs, preferences, cognitive characteristics and affective state.

Sofia Mysirlaki is a PhD candidate in the Department of Digital Systems of University of Piraeus (Greece), in the research Area of Technology-Enhanced Learning. She has a Master of Science (Msc) in E-learning and many years of experience in teaching. Her research interests include Multi User Virtual Environments (MUVEs), and Game Based Learning.

Alexandra Nakou with Master's degree in Information and Communication Technology in Education from the University of Athens is a research fellow of the Laboratory of New Technologies in Communication, Education and the Mass Media. She participated in various programs related to digital games implementation in educational purposes and in social media and intergenerational communication.

Christina Oikonomou. Teacher in Special Education, educates teachers about "Technologies of Information and Communication Technology (ICT) in Education", currently working on Master Thesis under Postgraduate Programme of the University of Athens entitled "ICT Technologies in

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Andrew Sean Wilson worked in biomedical research for the last twenty years. Interests are in use of technology in medical research particularly management of musculoskeletal diseases. Designed and developed educational computer programs to help patients and practising doctors gain better understanding of how to manage these diseases. Sees game based learning as another way of assisting in this.

The use of Games-Based Learning Within the Curriculum for Excellence: The Teachers' Perspective

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Abstract: In Scotland, work has been done over the past six years to transform education towards a fresh approach to what, how and where young people learn. This new approach, known as the Curriculum for Excellence (CfE), has already been developing in primary schools and is now ready to be implemented in secondary schools. One of the teaching and learning approaches emphasised under CfE is the use of digital games-based learning (DGBL) technologies in classroom education. A survey was distributed to the teachers from 49 primary schools across Renfrewshire, Scotland intended to gauge the current use of computer games for learning at primary schools in Scotland and how such tools fit within the CfE from the teachers' perspective. This paper presents the findings on the trends identified from this survey in relation to the teachers' view and motivation towards DGBL. The survey found that problem-solving and recollection were identified as the two most important skills obtained from computer games that are relevant to primary education and challenge, curiosity, pleasure and cooperation were rated as the most important reasons for playing computer games for learning in primary school. The main motivation for teachers to use DGBL was because the students enjoy using this approach and the most important benefit of DGBL was that it transforms learning into a fun, motivating and engaging experience. In general teachers showed positive attitudes towards DGBL and Mann-Whitney U tests found no significant differences in the responses between teachers who used DGBL and those who did not use a DGBL approach with the exception of the obstacles faced when using DGBL. The findings from this research will make an important contribution to the empirical evidence of games-based learning particularly with regards to its application in primary school education.

Keywords: games-based learning, curriculum for excellence, primary school, teachers' views

Tactical Incident Commander - an Online Training Game for Incident Commander Training

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Abstract: This paper presents an online training game for incident commanders to enact and create incident scenarios. The incident commander is the person in command on site when a rescue team is dispatched to a fire emergency. The challenge we are addressing in this work is to design a game and a game-based training process which can be used to support the change of work practice of fire fighters to become incident commanders (i.e. taking on a new professional role). The incident commander training game consists of two integrated parts: the *IT artifact* and the *usage process*. The two are integrated to provide necessary support for incident commander training via distance learning. The game is online and comprises three modules: The *scenario player*, the *scenario creator*, and; the *log tool*. The game and its pedagogical usage procedure are based on the theories of communities of practice and experiential learning. The novelty of this application lies in the combination of pedagogical theory and a specifically designed game. In comparison to other games for accident management training, the possibility for domain experts lacking of game design skills to create scenarios is an essential feature. Furthermore, the underlying fire simulation renders better "replayability" than a strictly branched scenario as the scenario creation is actually more of a process of setting conditions for the scenario than predicting each action of the player.

Keywords: serious games, game-based learning, fire-fighter training, communities of practice

Multivariate Assessment of Motivation and Emotion in Digital Educational Games

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Abstract: Digital educational games (DEGs) possess the potential to provide an appealing learning context which is intrinsically motivating for learners to engage with. However, this potential is either taken for granted or examined by means of questionnaires, interviews or behavioral observations in the course of evaluation studies. An adaptive game could increase the probability that a DEG is motivating and emotionally appealing. In order to adapt the game to the learner's motivational and emotional state while engaged with a particular scenario, an ongoing assessment of these states is required.

However, it would probably destroy the flow-experience and the feeling of virtual presence if a questionnaire occurs repeatedly in short time intervals on the screen. Thus, it is necessary to apply an approach that assesses the motivational and emotional state in a non-intrusive way. We describe a non-intrusive assessment procedure based on the observation of behavioral indicators which might deliver evidence for the learner´s states. A substantial set of behavioral indicators has been elaborated whereby some of them are derived from *information foraging theory* (Pirolli and Card, 1999). For example, the relative amount of time the learner is exploring the virtual environment can be considered as between-patch processing while the relative amount of time the learner is communicating with other game characters can be considered as within-patch processing. Values for each behavioral indicator (e.g. amount, frequency, seconds, etc.) are gathered repeatedly after predefined time slices, for example every 30 seconds. Afterwards, these values are contributing as weighted predictors to multiple regression equations on particular factors of a motivation model, an emotion model and a construct called clearness which is defined as appropriate problem representation. The underlying motivation model is based on the two factors of approach and avoidance motivation, the emotion model includes the factors valence and activation. A comparison of the resulting values for the constructs between the current and past time slices covers potential changes of the learner`s state over time.  The assessment of such changes forms the prerequisite for providing on-line game adaptations which aim to enhance the learner`s state, targeting towards a full exploitation of DEGs' pedagogical potential.

Keywords: digital educational game, motivation, emotion, assessment

Designing Serious Games for Education: From Pedagogical Principles to Game Mechanisms

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Abstract: Serious Games represent an important opportunity for improving education thanks to their ability to compel players and to present realistic simulations of real-life situations. The scientific community is aware that we are just at the beginning of a proper use of gaming technologies for education and training and, in particular, there is a need for scientific and engineering methods for building games not only as more realistic simulations of the physical world, but as means that provide effective learning experiences. This

requires an ever closer cooperation among the various actors involved in the overall SG life-chain, putting pedagogy in a central role, given the educational target of the SGs. This paper addresses the till-now inadequate integration of educational and game design principles and proposes techniques, methods and mechanisms that allow designers with different background to dialogue among each other and to define games that are able to integrate – by design – entertainment and educational features. In particular, the paper follows a design path that starts from the definition of reference frameworks and then analyses the typical categories of design patterns, before focusing on the user-interaction modalities – seen from a pedagogical point of view – given their relevance for the end-users. In the end, we discuss the sandbox serious game model that looks suited to implement joint pedagogical and entertainment features. We believe that the indications provided in this paper can be useful for researchers and stakeholders to understand the typical issues in SG design and to get inspiration about possible solutions that take into account the need to implement tools that are effective both as an entertainment medium and as an education tool.

Keywords: Serious games, pedagogical strategies, game design, game-based learning, technology enhanced learning, virtual worlds, user profiling

World of Warcraft in the Classroom: A Research Study on Social Interaction Empowerment in Secondary Schools

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Abstract: The aim of this study was to examine the effect of playing the online game World of Warcraft (WoW) on adolescents' social interaction and competence when played at school, in a class of teenagers. The research involved 7 classes from the first course at the Liceo Scientifico Statale "Marconi" (Milano, Italy). We analysed, from a pedagogical and psychosocial approach, the social interaction within the game environment, integrating qualitative and quantitative methods: ethnographic analysis, direct observation, and social network analysis (SNA). The results showed that the group experience and the cooperation required by this video game, allowed the classes to interact in a controlled environment, where they experienced social ties, roles and responsibilities, in turn influencing their social relationships outside the game.

Keywords: videogames, MMORPG, World of Warcraft, social competencies, secondary school

Specifying Collaborative Tools in Game-Based Learning Environments: Clues From the Trenches

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Abstract: Our research work deals with the development of new learning environments. We believe that Game-based Learning can significantly enhance learning and that there is a real challenge in collaborative learning. That is why we have developed game-based learning multi-players environments. "Learning Adventure" (LA) is one of them and is equipped with the capacity for collaboration in certain activities. LA allows us to set up experiments with students in our university. We apply the metaphor of exploring a virtual world, where each student embarks on a quest in order to collect knowledge related to a learning activity. We think that the way of acquiring knowledge during a learning session is similar to following an adventure in a Role-Playing Game (RPG). The teacher describes the rules of the game (scenario) and can create a particular world according to the topic to be learnt. Each area of the world of LA is dedicated to a learning activity. Some collaborative tools exist in the LA world and can be activated in specific areas: a chat tool is of course available, but more specific tools such as a post-it notes wall or a collaborative feather can also be used. We describe these collaborative tools, and conclude through examples that they are good media for group activities, since they have been designed with the collaborative concepts in mind. However, in order to make the production of the group better, the group activity should be regulated. This regulation should occur when the group actions are not conforming to the group (social) rules. Special indicators linked to the collaboration of the participants are thus introduced in the learning environment (e.g. level of interaction or level of helpfulness). We illustrate our purpose with two case studies. The first one describes a collaborative problem solving activity in groups of fifteen post-graduated students and the regulation. Due to non-participation of several members of the group, the teacher had to monitor the collaborative activity in order to obtain a better group result. The second one deals with a sharing of results session where students were asked to use the collaborative feather to write a common document. Self-regulation of the group was observed.

Keywords: collaborative activity; game-based learning environment; online multiplayer game; trace observation, regulation of collaborative activities

Putting Edutainment in Practice: From Courseware Authoring to Logic Games

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Abstract: Modern technology enhanced learning methods often are based on non-traditional instructional paradigms. Mass invasion of educational games feeds edutaiment grow, however, it suffers from a lack of cheap and effective implementations of eLearning games of various types making use of domain content of given course. The article describes a software framework for rapid prototyping of problem-oriented educational games based on a simple, light-weight content model offering semantic-oriented content organization. The model uses the constructional paradigm of UML (Unified Modeling Language) class diagram thanks to the fact they directly relate their elements with the parts of a usual ontology (classes, mono- and poly-hierarchies, class attributes, relationships and axioms). Thus, it is easily perceivable by content authors without any knowledge in semantic technologies. Next, authors present a software framework for creation of problem-oriented educational games such as puzzles, quizzes, word and even board games controlled by a game engine assuring automatic content extraction including inter-concept relationships. Thanks to the semantic organization of courseware content, there exist a great variety of educational games which may be easily developed over a course content repository organized according to the model. There are discussed several examples of practical realizations of word and board games built on the top of a semantic model of University course for undergraduate students and representing learning terms, facts, relationships and dependencies within that course curriculum intended for such specific audience. The paper provides results from practical experiments with such problem-oriented games in adaptive eLearning. It concludes with analysis of results about the level of appropriateness of GBL using these educational games for bachelor students in software engineering.

What Does it Mean to be a Game Literate Teacher? Interviews With Teachers who Translate Games Into Educational Practice

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Abstract: In this paper, two case studies are presented of teachers who translate video gaming into educational practice. These cases are situated within a broader framework of intermediality/multimodality and related to debates about (video game) literacy and the position of the teacher in education. The question of what it means to be a game literate teacher is explored. Although the results of this study are to be considered preliminary, they raise important issues, such as the role of expert video game knowledge for teachers involved in DGBL, the description of DGBL as an interplay between distinct but intermingling knowledge aspects, and the need for teachers to become anthropologists rather than gamers.

Keywords: digital game-based learning, new literacy studies, case study / interview approach, video game literacy, teachers as anthropologists

Close the gap - Obstacles and Solutions for the Missing Educational Games in Graduate Education

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Abstract: The problem of human beings to handle complex situations and understand the underlying system has already been researched several decades ago. Simulation games had been a proposed as an appropriate solution to train and practice the necessary skills. These results are complemented by recent research in game-based learning showing the successful implementation of good learning principles and the ability of providing situated learning scenarios. In spite of the obvious advantages of video games to provide a context for training systemic thinking, contemporary development projects concentrate on basic education and the corresponding skills at school and university. In graduate education, and especially in graduate engineering education, there is a gap of development. Although right there the handling of complex, interdisciplinary situations is imperatively demanded. This gap cannot be closed with the contemporary development paradigms of video games. From that point of view the development efforts increase with the level of education while the target group and development resources decrease. This dilemma can only be solved by changing the

paradigms of development, as they rely on a commercial perspective. They have to be adapted to the actual conditions of development in academic projects. The existing resources have to be recognized, activated and grouped, together with the target groups. With this approach it is not only possible to provide a basis for the development of advanced educational games, but the sustainability of educational games can be improved as a whole.

Conceptual and Technical Frameworks for Serious Games

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Abstract: The aim of this paper is to show how we can design a serious game and implement it. For this purpose, we propose a conceptual framework (a meta-design methodology) structuring the design of a serious game. Our conceptual framework is based on six independent yet complementary facets (or aspects) involved in the serious game development: the domain modelling (or domain simulation), the specification of learning objectives, the definition of interaction rules (or game rules), the level design and difficulty progression, the decorum description and the deployment of the game in an operational environment. They define a common language to improve communication and discussion between the stakeholders involved in the design and the serious game honing. Secondly, we have built a software framework for constructing serious games according to our conceptual framework. It aims to provide two main architectural requirements: reutilization and maintainability. We shall see what our design choices are and which solutions have been found according to the underpinning conceptual tools. We want to give a deeper understanding of our idea of a serious game by presenting a technical view of the design. We will give a thread example: a serious game (SpaceBidule) conceived in our laboratory.

Using Profiling to Optimise a Collaborative Session in a Learning Game

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Abstract: Our research work deals with the development of new learning environments, and we are particularly interested in studying the different aspects linked to users' collaboration in these environments. We believe that Games-based Learning can significantly enhance learning. That is why we have developed learning environments grounded on graphical representations of a course. These environments allow us to set up experiments with students in our university. The emergence of online multiplayer games led us to apply the metaphor of exploring a virtual 3D world, where each student embarks on a quest in order to collect knowledge related to a learning activity. In the environment, each part of the world represents a place, sometimes a collaborative place, where students are supposed to acquire a particular concept. Learning objects, artefacts or collaborative tools may be present in each location and a correct answer to specific exercises gives a key to the students, allowing them to access other activities. Although the students appreciate this approach, there is an obvious need for information about students' skills, especially for the teacher. Indeed, the teacher needs to adapt his/her pedagogical session according to what is going on during the collaborative activity. But, this adaptation only becomes possible when s/he has particular information concerning the users in the environment. In our approach, we can update the user model of the students thanks to specific questionnaires or behaviours in the world and use the results in order to enhance collaboration when such particular events occur, by using both data collected from traces resulting from the collaborative learning activity and information present in student's user models. In this paper, we focus on the need for collaborative information concerning the users in order to create and optimize teams. First, we describe briefly the "Learning Adventure" environment: a general game-based platform. Then, we explain how we update user model of the student via an adapted questionnaire (e.g. Belbin's Team-Role Self Perception Inventory). Then, when particular events occur, we notify the teacher of possible lack or problem in team constitution in regard of particular aspects collaborative activity (e.g. a team has difficulties to propose innovative solutions, to respect delay, or some students are chatting too much). From this statement, it became crucial to have indicators concerning both the knowledge (success and failure for sub activities) and the behaviour (chatterer, cooperative, resource investigator, co-ordinator, implementer, shaper, specialist or expert) of the different students during the pedagogical session. These indicators

help us to propose and to take the right decisions to enhance collaboration. We also propose innovative collaborative tools or artefacts directly in the game, making a complete immersion possible. A real experiment has been made at our university in the domain of project management validating the feasibility of the approach.

Keywords: collaborative activity; game-based learning environment; online multiplayer game; trace observation, regulation of collaborative activities, user modelling

Learning Chemistry Through Inquiry With the Game Legends of Alkhimia: An Evaluation of Learning Outcomes

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Abstract: Traditional modes of chemistry education in schools focus on imparting chemistry knowledge to students via instruction. Consequently, students often acquire the mistaken understanding that scientific knowledge comprises a fixed body of "proven" facts. They fail to comprehend that the construction of scientific understanding is a very human and social endeavor. To provide students access to an enhanced learning curriculum, "Legends of Alkhimia" was designed and developed as an educational game for 13 to 14-year-olds to foster the learning of chemistry through inquiry. The multiplayer game supports four concurrent players. It is played on personal computers connected via a local area network. The game embeds students in problem solving challenges related to the use of chemistry in realistic contexts. In attempting to solve these problems, students must engage in individual laboratory work using an in-game virtual chemistry lab. The game levels take students through a narrative arc that provides coherence to the entire gameplay experience. "Legends of Alkhimia", together with its associated curricular materials, instantiates classroom learning based on performance pedagogy: a pedagogy that constructs learning through the lens of performance theory (reported in the ECGBL 2010 conference). Leveraging the immersive affordances of 3D game environments, the learning experience is designed to engage students in the dialectic interplay between learning in the first person, based on playing the game, and learning in the third person, based on the Bakhtinian notion of dialog. In the first part of the paper, we motivate the rationale for game-based learning grounded on performance pedagogy. The second part of the paper investigates the research question: "Is learning lower secondary chemistry more effective with the inquiry-based Alkhimia curriculum compared to learning chemistry using traditional classroom teaching?" We report on an empirical study comparing learning

outcomes from a class of 40 students who learned chemistry using the Alkhimia curriculum with a control class of 38 students who learned chemistry through traditional classroom instruction. The students in our study were 13-year-olds from a typical government secondary school. Students in the Alkhimia program were engaged in an 8-week curriculum sequence involving six levels of game play. The chemistry understanding of all students was evaluated through a common assessment that comprised a complex separation task in chemistry, involving mixtures, solutes, and immiscible liquids. Two evaluation criteria were used: (1) effectiveness of separation, and (2) demonstration of conceptual understanding of chemistry. We found that the Alkhimia students significantly outperformed the control students when assessed on the extent to which effective separation was achieved in the students' proposed solution (t_{75} = 2.56, p = .026) and when assessed with respect to conceptual understanding of chemistry in the separation task (t_{75} = 3.41, p = .002). We discuss, from a theoretical perspective, how and why learning with the Alkhimia curriculum is efficacious. Our findings are significant in that they suggest how inquiry learning can be successfully enacted in a chemistry game-based learning curriculum, and they underscore the efficacy of approaching game-based learning in terms of performance.

Keywords: performance, play, dialog, inquiry, chemistry

Digital Game Literacy: The Difference Between Parents and Their Children

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Abstract: Digital Games have become a major recreational activity and part of the culture for so-called digital native children. Many researchers believe that digital games can be applied as an effective medium for instruction. Gee (2003) argues that e-learning has a reputation for being dull and ineffective, whereas games have developed a reputation for being fun, engaging, and immersive and capable of promoting deep thinking and complex problem solving skills. Many parents worry, however, that gaming is an activity that interferes with their children's schoolwork, social skills, and exercise (Kutner, Olson, Warner and Hertzog, 2008). The different perspective of parents towards digital games influences the potential development of game-based learning and impedes the progress of integration of digital games into school

curriculum design. Eco (1979) suggests that if educators want to use games or digital media for teaching and learning, they need to equip students with the ability to understand and to use digital media. For this reason, this study aims to assess parents and children's game literacy in order to diminish their perception conflicts on digital games. First, an extensive review of literature about the notion of game literacy is conducted and the analysis, evaluation and critical reflection on digital games are presented. Based on the literature review, a questionnaire of digital game literacy was designed as an instrument for assessing parents' and children's perceptions. Five hundred and one elementary school students and their parents participated in this study as paired sample. The statistic results indicate that there were significant differences between parents and their children in the understanding of digital game literacy in fourteen out of nineteen items. The results showed that children had better understanding than their parents of the information and rating system of digital games. The results also showed that parents' primary concern is how to maximize their control over children's game playing behavior. However, as expected, children can often find a way out of it with their perspicacity of digital games. That parents have less digital game experiences and lower game playing frequencies than their children could be the cause of this situation. The finding demonstrates the necessity of digital game literacy, fills the gap in people's knowledge of the digital game culture of students, and provides a useful foundation for educational purpose. Since digital game playing has become an activity which children enjoy but their parents worry about in contemporary societies, game-based learning cannot be declared simply as approaches to the acquisition of knowledge, or the mastery of particular practices. Before incorporating digital games in education, we need to educate the public with game literacy and an understanding and acceptance of digital games for its social and cultural position. Otherwise, bringing digital games into the school may create as many problems as it solves.

Keywords: digital game, game literacy, game-based learning, parenting, generation difference

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The Golden Rules and the Blue Ocean Strategy of the Next Generation Innovative MMOG and Computer Game Environment Design

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Abstract: Considerable financial and technical investments are being used for innovating and designing first class Massive Multiplayer Online Games

(MMOG). However, many companies still struggle to bring to market the perfect computer game being a MMOG or not. This paper will address the principal rules for designing the ultimate MMOG environments based on surveys conducted with private schools students and Nvidia Corporation that cover international body of gamers. Moreover, this paper reveals a new Blue Ocean strategy for the next generation computer games and VEs.

Comparing the Potential of Commercial Off-The-Shelf and Educational Video Games for Adult Foreign Language Education: An Experimental Study

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Abstract: The goal of this paper is to explore the experiences evoked by playing a commercial and two digital language learning games. More particularly, it deals with the differences in the playing and learning experiences of adult foreign language learners (N=62). While results of the experimental design suggest that the commercial game evokes better playing and learning experiences, these findings are partly neutralized by the attitude of the participants towards learning through video games and by being a gamer or not. This raises questions as to how video games should look to appeal to a public of learners that is not familiar with gaming in general and with digital game-based learning in specific.

Playing in School or at Home? An Exploration of the Effects of Context on Educational Game Experience

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Abstract: The goal of this paper is to gain insight into the effects of context on the educational game experience. More particularly, it deals with the differences in the playing and learning experiences of adolescent players in a domestic (N=135) compared to a classroom (N=121) context. It is

hypothesized that the playing and learning experiences will differ significantly between contexts. Results of the quasi-experimental design suggest that game and learning experiences are higher in a domestic compared to an educational context. These experiences, however, are influenced by the time spent playing and by technical performance. Moreover, the effect of experiences such as enjoyment and identification on learning experiences have a more substantial impact on perceived learning than differing contexts.

Keywords: context, awareness-raising, game-based learning, situated play, game experience

Utilising an Educational Framework for the Development of Edutainment Scenarios

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Abstract: Edutainment may be considered a developing contemporary research field particularly as new and open source game development environments are made available to the research community. Nevertheless, most edutainment scenarios are usually limited in terms of interactivity, design and aesthetics, a fact that may be attributed to the task complexity, which requires an integrated approach addressing all related fields. This work introduces a conceptual/operational framework for the development of edutainment scenarios, which is both game-based and rich-media oriented. The proposed framework, which for the main part must be considered an educational effort, combines theoretical background -within the fields of human-computer communication, interaction/educational design and entertainment studies- and practical solutions and techniques regarding software and digital games development, for the creation of custom edutainment scenarios. These abstract and more or less theoretical scenarios due to the seamless embodiment of technical practices may be easily developed as fully fledged products, be them games, applications or any kind of digital media that provide the unified service of education and entertainment. In such a case the end product (a digital system) permits the user to interact with the environment in a game-like manner, which enhances learnability and contributes to knowledge acquirement as the underlying objective. The framework, although not a rigid one but rather subjected to ad hoc adjustments, consists of well-defined stages, which include modern educational theories and state-of-the-art development environments. This paper describes in details the proposed educational framework for the edutainment scenarios and presents a recent case study that validates its

effectiveness. Despite the fact that the framework is still under development in a continuous feedback process with respect to the scenarios conceived by higher education students who utilise it, the results achieved so far are rather encouraging in terms of creativity, interaction design and aesthetics, thus addressing in a satisfactory manner the above mentioned deficiencies which –in our opinion- characterise a large portion of commercial edutainment scenarios

The Place, Role and Importance of Motor Games in the Physical Education Lesson for Secondary School Pupils

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Abstract: Starting from the assumption that motor games are a valuable didactic tool in the physical education lesson, the paper examines the effectiveness of movement games in pupils in secondary school. To this purpose, a series of tests were administered to 5th graders in schools in the county of Galati, Romania, viz. general and specific motor tests applied to boys and girls, as well as psychological tests. The conclusions demonstrate the validity of this type of activity, especially for younger pupils.

Gaming for Sustainability: An Overview

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Abstract: This study explored the potential of digital games as learning environments to develop mindsets capable of dealing with complexity in the domain of sustainability. Building sustainable futures requires the ability to deal with the complex dynamics that characterize the world in which we live. As central elements in this system, we must develop the ability of constantly assessing the environment that surrounds us, operating in it and adapting to it through a continuous and iterative individual and interpersonal process of revision of our frames of reference. We must focus on our world as a whole, considering both immediate problems and long-term consequences that decision making processes could generate. Educating for sustainability

demands learning approaches and environments that require the development of systems thinking and problem-solving, rather than solely the acquisition of factual knowledge. Due to their characteristics, digital games present a high potential for "learning for complexity". Although they can be very different from one another, digital games can indeed be proper complex systems. In fact, many modern games are set in sophisticated cyberworlds, requiring players to engage in cognitively demanding tasks relying on problem-solving and decision-making skills, dealing with ill-structured problems, unpredictable circumstances, emerging system properties and behaviours, and non-linear development of events. Furthermore, these environments support remote interactions across large numbers of players, often requiring collective engagement in the pursuit of common goals. To understand how games are currently used for "learning for sustainability", we analysed twenty games. The games were selected based on their visibility on an online search engine. The analysis showed that there is an emphasis on using single-player games to educate children and to foster the acquisition of factual knowledge. Furthermore, our results show that sustainability games often do not leverage the usage of complex systems as gaming environments, hence not fully exploiting the potential of games as learning environments to develop "thinking for complexity".

Keywords: sustainability, complex systems, game-based learning, digital games

Assessing how Game-Based Learning is Perceived in Irish Education

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Abstract: Despite a solid body of evidence on the effectiveness of Game-Based Learning, very few schools and universities have embraced this medium in Ireland. Recent research shows that, aside from the technological and educational qualities of GBL systems, educators are essential to a wider acceptance and use of video games. This paper will present results from a survey conducted in Irish universities and schools to determine how Game-Based Learning is perceived by teachers and lecturers. The survey, which was sent to Irish teachers and lecturers, assessed their teaching and gaming experience (e.g., use of ICT or gaming propensity), how they believe video games could help teaching and learning, whether they used video games in their teaching, and the factors that could either help or prevent the inclusion of video games in the classroom. The results show interesting trends, notably that, while games seem to be acknowledged for their educational and

motivational benefits, more information needs to be provided to instructors in terms of empirical evidence and best practice. The author analyses the results of this survey and present implications for the Irish educational system, and European instructors at large.

Accreditation! The Responsive Curriculum Game

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Abstract: It can be difficult to engage colleagues with the findings and recommendations of an externally-funded project, even when, or perhaps particularly when, it has major implications for institutional processes. The authors were involved with a large single-institution Higher Education change project that aimed to make the university more responsive to changes in curriculum needs, the student voice, employer demands, and external legislative and political pressures. The task of working with stakeholders to disseminate project findings and explore the potential to rethink the course accreditation process was not an easy one, it being a dry subject at best. In addition to writing a standard project report, it was decided to adopt a game-based approach as a novel means of engaging audiences. However, since budget was limited, and collaborative digital games are typically expensive to design and develop, it was decided to adopt a low-tech approach and develop a simple board game based on the findings of the project to help to engage colleagues. The game aims to help disseminate the principal findings of the project to staff, encourage discussion, and demonstrate how these findings relate to the key institutional process of course design and quality management. This paper provides an overview of the game developed and explains how the game mechanics were designed to link to the project findings and the intended learning outcomes and used to produce a low cost prototype of the game. The difficulties of retaining an analytical element with relatively short game play (30-45 minutes) and an attempt to make the process entertaining are discussed. The game was evaluated for its ability to generate discussion among university staff about the project findings and their implications for the process, as well as for its playability, and the findings of this evaluation and recommendations for future development are explored.

PCARD: Integrating Games Into Classrooms

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Abstract: Play, Curricular activity, Reflection, and Discussion (PCaRD) is a pedagogical model that was developed through a yearlong design-based research project for the systematic integration of games into K-12 curricula. In this paper, we will describe the PCaRD model by addressing the following research questions: (1) what is a systematic game-based learning model for classrooms? and; (2) how does it influence student learning and motivation? The project involved twenty urban 9th grade students in an elective course that supports social studies, science, and mathematics learning. Using commercial and serious games with the PCaRD model, students engaged in learning activities grounded in inquiry, communication, construction, and expression (ICCE) that aided their academic understanding, motivational valuing, and exploration of possible identities. We posit that digital games with the use of meaningful and relevant activities facilitated by locally situated experiences that involve ICCE leads to a valued experience of content knowledge construction which in turn aids exploration of possible selves and identity formation. Data was obtained from quantitative and qualitative data sources. Further, problem-based activities such as designing avatars on the idea of one's mathematical identity and designing a game on the principles of scientific inquiry were provided for students to value these experiences as personally useful knowledge. Statistically significant differences for mathematics knowledge and a positive change in student valuing, interest in mathematics and physics, and how they thought of themselves in relation to their content identity were found. Case analysis and observations highlighted the shifts in students' interests and value for one game over another, and preference for one content area over another possibly because of its relevance to potential careers. PCaRD is an empirical pedagogical model requiring careful teacher participation and facilitation to support learning goals based on gameplay. The model guides teachers in scaffolding gameplay from entertainment or serious games to support student learning in a systematic way.

Keywords: digital games, PCaRD model, student learning, motivation, pedagogy, K-12 classroom

Advantages and Disadvantages of Storytelling in Teaching English at Academic Level: A Case Study in the University of Ploiesti, Romania

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Abstract: The process of storytelling can be seen as a reflex, as most of us use it as a routine within the daily conversations, not only formally, but also informally. From this point of view, in the classroom context, it may be considered as a more reliable way of approaching language teaching. Various language trainers consider storytelling as a very effective and attractive technique in teaching young learners, as children really enjoy being told stories. The aim of our case study is to show that storytelling can be successfully applied within the language classrooms at academic level as well, in order to improve students' vocabulary, listening and speaking skills, this being perceived as more effective than reading a given story. Starting from a theoretical background, the study is based on empirical data, collected from two groups of students, studying English as a foreign language within the University of Ploiesti, Romania (majoring in English Language and Literature). During their English classes, a group of students were taught using the integrated-skills approach. The teacher used oral narrative during the class, offering herself as the source of the listening activity. Some of the students were required to narrate their own personal stories while their mates had to reconstruct what they heard. Based on this core part of the lesson, the teacher was able to design different types of activities (reconstruction, comprehension questions, summarizing etc.). The other group of students was given the same story, not being delivered orally, but receiving the transcript. At the end of the class, they were also asked to narrate their own stories.

Keywords: storytelling, advantages, disadvantages, personal stories, teaching technique

What Makes a Good Serious Game – Conceptual Approach Towards a Metadata Format for the Description and Evaluation of Serious Games

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Abstract: Serious Games (games 'more than fun') combine game technology and game-based methods and concepts with further technologies and

research disciplines such as ICT, digital media, sensor technology, psychology, pedagogy or sports science and apply it for different application domains. Prominent examples represent games for health, persuasive games, advergames or games for education and training. But what makes a good Serious Game? The paper starts with a basic understanding/definition of Serious Games being elaborated and presented at the Serious Games Conferences 2010 and 2011, followed by an analysis of related work and relevant aspects for the elaboration of a metadata format for the description and evaluation of Serious Games. This includes parameter sets for game studies and rating systems and evaluation criteria for (serious) game awards as well as usability and user experience issues and evaluation frameworks for Serious Games and educational games in particular. Based on the results of the analytic work, chapter three introduces a rough concept for an extensible metadata format for Serious Games (MDF-SG), offering a 'core' level with essential information about a serious game and a comprehensive MDF-SG Level 2, which might serve as basis for the evaluation of Serious Games. Further, MDF-SG foresees the concept of application 'profiles' for dedicated Serious Games application fields. Finally, a conclusion summarizes the main results and points out further research investigations and aims to encourage an interdisciplinary discussion – also among academia and industry – with regard to a detailed definition of the format ($\rightarrow$ standardisation).

Gender Differences in Motivations for Playing Computer Games: A Combined Analysis of Three Studies

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Abstract: Computer games have become a very popular form of entertainment and have had a significant impact on how University students spend their leisure time. More recently educationalists have become optimistic about the potential of computer games to help people learn effectively. If games-based learning is to become a recognised teaching approach then motivations for playing computer games must be better understood. This paper presents the combined analysis of three studies looking at motivations for playing computer games, performed over a four year period from 2005 to 2009. The paper focused on differences of motivations in relation to gender. The study found that challenge was the top rated motivation and recognition the lowest for playing computer games in general. Challenge was also the top rated motivation for playing games in

HE, with fantasy and recognition the lowest. Males gave higher ratings than females to all motives, reasons for playing games for learning in HE, apart from recognition and fantasy and attitudes to computer games, although males and females did not differ in believing that playing computer games could be helpful for developing useful skills.

Motivations for Playing Computer Games at Tertiary Education Level: A Comparison of Further Education and Higher Education Computing Students

Thomas Hainey, Thomas Connolly, Liz Boyle and Mark Stansfield
University of the West of Scotland, UK

Abstract: Over the past forty years computer games have played an increasingly important part in the way that university and college students spend their leisure time and have gradually replaced traditional leisure activities. It is therefore very important to understand learner motivations for playing computer games and playing computer games in tertiary education contexts as the field of games-based learning has a dearth of empirical evidence supporting the validity of the approach. It seems an obvious assumption that computing students would tend to play computer games quite significantly. This study will examine the motivations of computing students for playing computer games and playing computer games in an educational context at tertiary education level. The study will look at computing students in Further Education (FE) and Higher Education (HE) and will perform a comparison to assess if these motivations are similar or dissimilar based on Malone and Lepper's 1987 framework or intrinsic motivation. The study will contribute a comparison of the same kind of student at different levels of tertiary education and different levels of the Scottish Credit and Qualifications Framework (SCQF).

Do Students Trained Using Serious Games Become Better Sales Representatives? An Experiment to Study the Performance of Academic Serious Games

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Abstract: This paper analyzes the potential of serious games for professional and pedagogical purposes and learning. To do this, the authors have questioned the efficiency of these games. They present an experiment conducted with 66 students trained in sales that compares a group of players with a group of non-players. The game's impact on skills was studied from two angles: first from a theoretical point of view (based on the marks obtained in tests), and second from a practical point of view (based on professional situations). The responses for continuous variables (the marks) were measured depending on the two control factors (the type of training and past sales experience) and could each take two forms: on the one hand, the learning method (serious game group or test group) or on the other hand, depend on the past sales experience (with sales experience or without sales experience). As the level of experience was not identical in each of the four configurations, we found we were in a two-factor ANOVA configuration and followed an unbalanced plan. Whereas the results show that the serious game has a weak potential for students who are inexperienced in the field, they also underscore the fact that the game has a very positive effect on learners who are already experienced in sales. The serious game could therefore act as a booster. The authors have then highlighted the potential side effects of these learning tools, such as the formatting of profiles or the "Disneylandization" of business. To avoid this, they suggest the trainer's contextualizing role be reinforced.

Keywords: serious games, ICT efficiency, experiment

Influence of Learning Styles on the Acceptance of Game Based Learning in Higher Education: Experiences With a Role Playing Simulation Game

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Abstract: This paper describes a study about the Beer Distribution Game in higher education as part of e-business courses. The Beer Distribution Game is a web based role playing simulation game of a supply chain. The original

game was developed by the System Dynamics Group at MIT in the early 1960s. What is usually referred to as "the beer game" has been played all over the world by thousands of people ranging from high school students to chief executive officers and government officials, and it recreates a supply chain from industrial fabrication of the product to distribution. The simulation illustrates the building up and reinforcing processes of demand fluctuations within the supply chains. Simulations have proved to be very effective instructional techniques because learners cope with a model as if they were confronted with real life experiences. The present study is based on a survey of specified groups of students from two European universities. Based on Kolb´s (1984) experience based learning model the different learning styles of student participants were investigated and compared with their attitudes to game based learning in general and the beer game in particular. Students described how playing of the beer game helped them to understand the processes within supply chains and the important role of readily available information to manage these processes. Moreover, the study examined the learning success of students regarding their knowledge about dynamic systems and problems of the supply chains.

Keywords: problem based learning, learning styles, role playing simulation game, beer game, bullwhip effect, business education

Outdoor Initiative Games Using Mobile Digital Devices – a Preliminary Game Design

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Abstract: The literature confirms mobile digital devices to be well suited for as a basis for educational games. Since the number of regular users is rising as rapidly as the variability of applications run on the devices, we argue that mobile phones should be employed to enhance the gaming and learning experiences in outdoor initiative games. To create such new blended games, a design and structural framework has been developed. It combines aspects of mobile device based games and computing with typical factors of outdoor activities. Due to the diversity of these fields, a number of critical issues emerge and are currently being worked on.

Keywords: outdoor initiative games, mobile digital devices, blended learning, experiential education, game design

Towards Cultural Diversity Through Sports and Games

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Abstract: Cultural diversity has become an inevitable issue in many European countries, especially with regards to large cities. In Augsburg – central Bavaria, Germany – 40 percent of the inhabitants today already have an intercultural heritage, which makes this city a scientific looking glass into the future of many European cities. The *Institute of Sport Science* at the University of Augsburg conducted a compound survey covering various fields of implementation of sport and games activities throughout the local community, referred to as the *ASIS* (Augsburger Sport und IntegrationsSurvey). The research investigated the difficulties and opportunities inherent in the diverse management of sports and games. Interviews and group discussions with administrators, facilitators and active sports (wo)men of various cultural backgrounds were conducted and evaluated. Based on the findings, a set of recommendations was composed. In this paper, we will summarize the findings of this survey as well as the main recommendations. Also, we present *initiative games* as a form of serious games and argue that they have ideal features for use in an educational setting in order to raise social awareness and promote cultural diversity in a community. A related research project starting this autumn is briefly outlined.

Keywords: cultural diversity, intercultural learning, social integration, initiative games, sport

Student Behaviors and Evaluations of Collaborative Learning Game

Jason Holdsworth and Siu Man Lui
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Abstract: This paper highlights some interesting results from a preliminary study involving the choice of technology in Australian rural secondary education. Advances in computers, wireless networks, and mobility have fostered collaborative learning environments. While a large body of research has documented successful intervention strategies and software applications for computer-based and mobile-based collaborative learning systems with respect to computer games and mobile games for educational purposes, little of the research has examined the effect of the two different technology platforms (computer verses mobile) on students' behaviors and evaluations

while using a collaborative learning system. We developed an open-ended collaborative learning game and implemented it on desktop and mobile environments. The collaborative learning game we developed for this study is a multi-player game we called CipherGame. The game is essentially a word-based guessing game. A group of students work together to solve a challenge sentence that has been encrypted with a simple mono-alphabetic substitution cipher (Singh, 2000). The game has no time limit, but we found the students typically took 45 minutes to complete the game. A preliminary study was conducted with the assistance of the ICT teachers and students from the 2009 cohort at Smithfield High School, Cairns, Far-North Queensland, Australia. The purpose of this preliminary study was to begin exploring how students use computer-based and mobile-based collaborative learning systems. We looked at the students' behaviors and evaluations of using the collaborative learning game as a technology artifact, and students' communication pattern when using the systems. We were interested in looking at the extent of help contributing and help seeking student activities during game-play, and also students' interactions during the collaborative process. We found that perceived enjoyment was significantly lower with the desktop environment, while there were no significant differences on perceived ease of use and perceived sense of group belonging. We therefore, discuss the potential implications of this result with respect to the future of technology in Australian secondary education.

Keywords: eLearning, mLearning, collaborative learning, secondary school education

What can Breakdowns and Breakthroughs Tell us About Learning and Involvement Experienced During Game-Play?

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Abstract: Alongside the growing mainstream appeal of digital games, there has been an increasing amount of academic interest in how games can be used to support involving learning experiences within formal educational settings. While there has been particular emphasis on the potential of games within these contexts, there is still much to be understood about what happens during specific instances of game-play (Squire, 2008). For instance, it has been argued that research in the area would benefit from further exploration of both how and what people learn informally when they play games during their leisure time (Oliver & Carr, 2009). This paper aims to address some of these issues by reporting on research which explores how involvement and learning come together in and around instances of game-

play. A multiple case study approach was adopted, which included game-play observation and a cued post-play interview. Eight cases were carried out in total, with participants being asked to come into the lab to play games on three different occasions and to keep a gaming diary over a three week period. This paper focuses on exploring the detailed processes that occur during game-play in order to consider how people learn through play. The preliminary findings of the analyses are presented through examples from the case studies which illustrate how these breakdowns and breakthroughs occurred with respect to: Action (e.g. problems with the controller, finding out a new attack), Understanding (e.g. not knowing what to do next, figuring out how to solve a puzzle) and Involvement (e.g. losing interest in the game, seeing evidence of progress). Consideration will also be given to how breakdowns and breakthroughs relate to each other and the influence they have on learning and involvement within this context.

Playability Design Pattern in Educational Video Game

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Abstract: Educational Video Game (EVG) as a combination of two components from different nature (learn and play) is hard to design and implement, and sometimes is more a matter of intuition, due to the multidisciplinary of these fields (Fun and Education). Unfortunately, there is an important issue that no existing educational video game methodology addresses and that is: how to make good, effective designs from playability and player experience (PX) perspectives, which are very interested in EVG. This is the barrier that faces successful experienced games designers. To overcome this problem we propose the use of design patterns as an effective model to support design and analysis of EVG, and to improve the experience of video games and the efficiency in the learning process. Design patterns offer a way forward, and forms a good tool for recording and reutilizing design experience, where it provides explanation and evaluation of an important and a recurrent design. Using design patterns in EVG gives us the ability to describe the interaction between the EVG components and 'use' these components by players to affect the Playability of the EVGs. In this work we present how design patterns support the PX based on the playability characteristics, and provide the necessary help to the video game designers to concentrate their game ideas. Our proposal derives what is suitable and useful for EVG design patterns by studying the related works from the

different video game genres, interactive system, hypermedia systems and multimedia systems. The suggested patterns aim to facilitate the EVG development, captivate the essential information and the necessary requirements to understand the discussed problem and the proposed solution and present the interrelationships between EVG components and playability attributes. We have also introduced a new taxonomy for grouping the proposed patterns in a flexible interactive structure related to EVG elements and the common design problems.

Camaraderie, Cognition, and Meta-Cognate: Unpacking Trajectories of *Becoming* in WoW

Azilawati Jamaludin, Mi Song Kim and David Hung
Nanyang Technological University, Singapore

Abstract: This paper attempts to unpack trajectories of becoming in terms of construction and negotiation of identity as youth players engage in game play across online and offline spaces. Situating our study within a context of the immensely popular MMORPG, World of Warcraft, we identify tenets of camaraderie, reified through inclinatory affinities, cognition, and meta-cognition that underpin youth's becoming process-having identified these constructs to be the buttress to learning. We explicate this issue by proposing a self-socio framework, recognizing the importance of these dialectics in drawing out design and pedagogical principles for education.

Can Games Based Learning Assist Teachers in Achieving the Aims of Curriculum to Bilingual Students of Different Ethnic Minorities?

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Abstract: Computer video games have become highly interesting to educators and researchers since their sophistication has improved considerably over the last decade. Studies indicate that even simple video games are offering important educational benefits in classrooms with bilingual students from different countries. However, a need for identifying truly useful

game for educational purposes exists. This article begins with an examination of lower level learning in so-called edutainment products and concludes with an example of how teachers can use computer games and video based activities as an advanced way to improve and enrich the existing curriculum. On the other hand, as a teacher, it is important to be aware of such technology and to know that these instruments can all be used in the classroom in some way. Can games based learning helps in eliminating racism problems, assisting the acceptance in small communities of the new immigrants, and can assist the gifted and talented students in their future plans? This essay identifies characteristics of highly cognitive virtual interactive environments and offers a detailed index and scoring rubric as a tool for teachers and preserves teachers to use when evaluating the tendencies a video game demonstrates toward encouraging higher order thinking in its participants. Computers have been used in the classroom for years but now it has become so advanced that it allows teachers and students to use the computers in a more efficient way. Computer games have been developed for everything and anything, including topics such as typing, reading, math, science, foreign language training, etc. Research has been done to examine whether or not these games are useful to children. It appears that children are growing up in a technological world and that these games are useful to them because it is something familiar.

Keywords: bilingual students, intercultural didactic, computers, immigrants, virtual classrooms, anti-bias curriculum

User-Generated AI in Sports Education

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Abstract: User-generated media highlights sharing: sharing videos, images and texts in social media, as well as sharing character outfits and maps in games. However, behavior is one of the aspects that are not shared. The aim of this study is to show how user-generated behaviors can be shared in different types of sports games. According to the examples in this study, game and media developers can design extensions that enable users to easily construct behaviors. According to the preliminary results, we can model the sports behavior in a limited strategic sense. In terms of game play, the recorded and re-produced artificial behavior is human-like and realistic. For some athletes, our AI could learn nearly 70% of the same strategic behavior. In terms of cognitive sciences, we do not have a scientifically exact tool. However, in terms of game development, sports education and sports

coaching, we do have a method that brings games and strategic simulations into an era of human-like, user-generated behavior.

Experiences With an Approach to an Unobtrusive Assessment of Motivational States in Immersive, Narrative Learning Environments

Michael Kickmeier-Rust, Elke Mattheiss and Dietrich Albert
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Abstract: Educational computer games are a highly popular but also a highly challenging field where (technology-enhanced) education meets entertainment/gaming. On-going endeavours concentrate on the need to translate the state-of-the-art in conventional e-learning, this regards in particular to technologies of intelligent and adaptive tutoring, to educational games. This is a non-trivial attempt since methods of personalization, such as pedagogical guidance or adaptive curriculum sequencing have a substantial impact on a game's flow, in particular on the narrative. More importantly, successful educational personalization in "gamified" virtual learning environments – necessarily – goes hand in hand with motivational personalization. To create such environments that are (potentially) able to actively and autonomously motivate and (re-)engage learners while playing and learning, even trickier, while proceeding through meaningful educational sequences, it takes a robust, valid, yet simple and unobtrusive assessment and interpretation of motivational states. This paper gives an overview to the relevant body of existing research and a rational on the selection of indicators, rules, heuristics, and guidelines for a motivational assessment in immersive learning environments. Subsequently, we describe a method to apply those aspects, in essence response times, error numbers, number of help requests, attention, and confidence, to an in-game assessment procedure. The principles of the approach have been exemplified in an appealing educational game, "Feon's Quest", teaching geography for 12 to 14 year olds. Finally, we will briefly report on the results of experimental evaluation studies using the game demonstrator. The results of those studies provide some indications that the envisaged unobtrusive in-game assessment of motivational states is a promising corner stone of psycho-pedagogical personalization in immersive learning environments.

Designing Educational Exertion Games for Young Children

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Abstract: The potential use of serious games in educational settings is huge, because a large and growing population is familiar and engaged with playing games. However, the popularity of games has aroused also problems. For example, obesity has recently become a big problem in many countries. The emerging exertion game genre tries to change this by encouraging players to perform physical movements during gameplay. In this paper, a new serious game genre, educational exertion games that aim to facilitate users' fitness and physical development in educational context is proposed. Such combination is a new research branch in the era of serious games field. We studied a educational exertion game called Yummy Attack that was designed for young children. 16 children aged 4-7 years tested the game dealing with dietary issues in one Finnish kindergarten. The usefulness of the game was studied with questionnaires and interviews. The evaluation of the game focused on learning gains, playing experience and perceptual issues. The results indicated that educational content could be embedded into exertion games. Children liked to play the game and some of the players clearly benefited from playing. It seems that educational exertion games could be useful services at least for small kindergartens that have space problems and difficulties to organize motivating sports sessions. This is very important because obesity and the lack of exercise seem to be big problems even with young children. The results also indicated that if we design educational exertion games for children we should remember that the less is more. Young children tend to have problems to grasp all game elements and consequences of their actions, especially if the game tempo is fast and the game world is audio-visually rich. All the elements have their cognitive price and their existence should be justifiable. In spite of promising results more research, particularly in the area of educational exertion game design is needed.

Keywords: game design, exergame, learning, game balancing, child

Towards an Analysis of Cooperative Learning-Behaviour in Social Dilemma Games

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Abstract: Apart from individual learning advances, players also adapt their strategies when playing repeatedly with others in multiplayer group scenarios. We describe a setup for a Social Dilemma Game, tightly connected to Facebook, measuring users' behaviour and game results and connect these data to social network information in order to create a graph model that can simulate and predict the group behaviour. Thus, results are expected to support the research aims about the relation between friendship or player attribute similarity with the probability of choosing a cooperative strategy. This will build the ground for further research and design for group training games, scenarios and peer matching algorithms.

Keywords: group cooperation, social dilemma, serious games, cooperative learning

Designing a Large Multi-Player Simulation Game to Encourage Reflection and Critical Debate

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Abstract: There is great potential to design digital simulation games as part of professional training settings. However, there is little research on how a large group in a classroom or seminar can all play at the same time. In this paper we describe the design and first in-the-wild deployment of the 4Decades game, which involves up to 30 players simultaneously in a simulation of global climate economics. Using a network of shared devices and ambient displays, a fast-paced collaborative game enabled players to reflect on prior learning, strategy making and their critical understanding of the simulation.
Keywords: serious games; multi-player simulation; game design; field study

The Importance of Humans in Simulation: Allowing the Lure of Technology to Drive Development

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Abstract: Serious games that simulate the subtle complexities of real life, pose a significant challenge in regards to requirements gathering. This case study involves a multi-player, inter-disciplinary medical game that simulates a hospital ward with medical scenarios based on the prescribed curriculum for junior doctors. Initially, both medical professionals and developers were focussed on finding ways to apply innovative 3D serious game technologies to build an eLearning environment for practical skills based medical training. The proposed system would allow an intern to play the role of an on-call doctor while employing AI and expert medical knowledge to simulate patients and supporting medical staff. However, a flaw in the basic premise of the project and the complexity of requirements forced unexpected changes during the development process. After the creation of text based documentation and flow charts for the medical diagnostic decision making processes, it became obvious that the subtly and complexities of the hospital ward and the interactions between patients and staff could not be adequately described through traditional documentation. To this end, the medical professionals developed video walkthroughs of real life scenarios reflecting good diagnostic practices and varying degrees of bad diagnostic practices. Along with the videos, PowerPoint slides were provided with key points, behaviours, and actions in the diagnostic and decision making process. Over an extended period of evolutionary requirements gathering, adaptive planning, prototyping, and testing, further inadequacies became evident. Email communications and videoconference proved to be inadequate. After extensive development, the only way to move forward was to organise face-to-face discussions between major stakeholders (a cross disciplinary team with educators, medical professionals, and IT professionals). At this point, a major flaw was identified and essential project requirements began to emerge. It was realised that teaching and learning outcomes had not driven the project. Rather, new technologies had been allowed to drive the project with learning outcomes constrained by the chosen technologies. It was further realised that the problem domain involved people and communications employing various mediums. It also became clear that the expert medical knowledge underlying the complexity of speech and behaviours required for the AI (such as a difficult patient or psychological issues) was far too complex to implement. This led to a movement away from AI driven avatars and a refocussing of the project on to human interactions and communication. This

change in focus is currently being implemented through role-play of patients and health care professionals in a real time multi-player networked environment with the narrative set up through back stories. Testing was also refocussed on to clinical reasoning, problem solving, and communication skills with responses recorded in detail in communication logs for later evaluation and reflection. Features of the simulation are scheduled for testing at the Cairns Base Hospital using a group of 16 interns. A questionnaire will be administered before and after a play session involving a predefined medical scenario in a single player environment to help extract and refine the multi-player requirements for the current stage of development.

Can Autobiographical Memories Create Better Learning? The Case of a Scary Game

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Abstract: We all have a few distinctive memories from school – fond or horrid, close or distant, from class or from recess. But because our minds tend to conserve space and only register new and unusual information, most days and lessons just dissolve into a blur. Therefore, autobiographical memories are usually a poor indication of what anyone has learned in school. Here, we attempt to conceptualize the interplay between dramatic experience and conceptual learning in terms of memory processes. We present a scary *Mobile Urban Drama* (Hansen et al. 2008, 2011), "The Chosen Ones", designed to teach 7-9th graders science in the great outdoors. Using theories of how episodic and semantic memory formats interact, we ask if the memorability of the game, also have an influence on how players retain the kind of fact-based information that our schools are so fond of testing.

Story Decorated Learning Activity Generation in a Context-Aware Mobile Role Playing Game

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Abstract: Game-based learning is a popular method and has implemented on mobile platforms to make ubiquitous learning more efficiently. However, most of mobile educational game researches focus on specific topic/discipline/curriculum with small applications and few researches consider attracting users playing the educational game continuously. In this research, we design a Context-Aware Mobile Role Playing Game (CAM-RPG for short) that can generate a series of story-based quests (i.e., a quest chain) automatically for users and make the users interact with specific real (e.g., projector, rest room, pine tree, etc.) and virtual (payroll system, business policy, E-Commerce course, etc.) objects in the real world. The useful contexts are filtered out by using information theory and rough set and then are re-organized into a series of learning activities (i.e., a learning activity chain). To make the learning activities attractive to the users and make the mobile game become an immersive learning environment for the users, we analyze and apply narrative elements into the learning activity generation process and transform the learning activity chain into a quest chain in the game.

Computer Role-Playing Games as an Educational Game Genre: Activities and Reflection

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Abstract: Our work aims at improving the integration of learning and playing in digital educational games. By studying game genres, we identify typical gameplay mechanisms to which teaching methods and learning processes can be mapped. This paper examines the prospect of computer role-playing games. We claim that these come with several features useful for educational purposes. For instance, a reusable educational game engine must be able to realise a variety of teaching methods. RPGs support this by a pool of activities: Crafting, Conversation, Trading, etc. In our approach to immersive

didactics, we map different constructivist teaching methods and learning processes to different RPG activities. In addition, educational games must support reflection during and after learning. RPGs provide tools for reflection in the form of in-game journals. The paper provides first support for these claims by reporting on results from four studies: (1) We built a proof-of-concept prototype that maps the Inquiry Learning process to the RPG activity Crafting. (2) We studied the use of journals as reflection tools for Inquiry Learning by having students perform a real-life Crafting experiment and use blogging software to create a live lab report. The resulting document shows that in constructing knowledge the students followed the intended Inquiry Learning process. (3) We carried out a focus group interview with researchers in the Humanities asking them to brainstorm a game scenario that would support learning in Interpretative Writing. The result was the design of an interactive scene making use of the RPG activity Conversation. (4) We studied the use of journals in game-based Interpretative Writing by having students play a few turns of a murder mystery board game and arrange their developing knowledge (evidence) in a Wiki. This worked, and it was interesting how students amended the given structure. We conclude with an inter-study discussion of the results.

Keywords: constructivist learning, role-playing game, activities, reflection, learning journal

Supporting Learning Role-Play Games Design: A Methodology and Visual Formalism for Scenarios Description

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Abstract: The impact games are known to have on commitment is pushing more and more companies to use training programmes that incorporate games, including Learning Role-Play Games. This article presents the methodology (ScenLRPG) and formalism we have defined to support instructional designers in the design of such programmes. The ScenLRPG methodology is based on two main principles: the first one is to make designers integrate the use of game principles into their reflection; the second one is to offer them reusable example scenarios. A visual formalism has been defined in order to describe LRPG scenarios and facilitate their sharing between designers and their presentation to clients. The article presents a qualitative experimental study carried out with sixteen target users. Audio recordings, draft documents, scenarios produced by the participants and

questionnaires were collected. Results from a first phase of the study deal with "spontaneous" design of game-based training scenarios: how game dimension is taken into account by designers? How scenarios are formalized? What are the difficulties and needs expressed in such a task? These results give us more elements to enrich our methodology. Other results are about the use of ScenLRPG methodology and formalism. They provide interesting elements to validate our main working hypothesis: an approach putting forward a reflection on game principles that can be used in a training scenario in order to engage participants; a design methodology based on the reuse of scenarios; a simple visual formalism to describe LRGP scenarios to structure designers' thinking and facilitate dialogue and sharing. Some results also raise new issues that we will have to consider in our future work.

Peer Group Learning During the Board Game Sessions

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Abstract: A child can learn new things and skills by playing board games. Board games can also offer a frame within which a child's learning can be studied. The purpose of the present paper is to explore what and how children can learn from each other through interaction during board games. A preliminary study, conducted by a group of students of Laurea University of Applied Sciences, showed that a board game could be used to support children's social learning and emotional skills. They found out that children's social learning could be promoted through discussions stimulated by the questions the players had to answer and the tasks they had to perform in the course of the game. The players learnt new skills transferable to daily activities. We found the results of the preliminary study encouraging. They showed that there is a need for further studies on learning in peer groups. According to various researchers, children can learn social skills and empathy in peer relationships. In the day care groups, which are heterogeneous, children can also be taught to see and accept differences. The key concepts of the present study comprise sociocultural theory of learning and children's peers. According to Vygotsky's sociocultural theory (1978, 92–96), children have a need to play and they find playing a game joyful. Verba (1994), who discusses various forms of cooperation among children in her study, pays special attention to the importance of a peer group to a child's cognitive development. The theoretical background of

the present study was based on Verba's classification of group learning. The analysis was built on the following three categories: activity, sharing and management. The data was gathered from two Finnish day care centers by observing 39 children playing a board game in groups of 3 or 4 players. Special attention was paid to the role of peer group learning during the game sessions. At the present stage, we have been assessing 19 game sessions, which were videoed twice in the autumn last year. We also give examples of the kind of research we have been conducting in order to find out how board games can be used to support children's learning in general.

Introducing Component-Based Templates Into a Game Authoring Tool

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Abstract: Serious Games, including educational games, can be created based on various business models. Commercial Serious Game developers as well as non-professionals (teachers, employees) tasked with creating a game face significantly smaller budgets available for such games compared to games for entertainment. A use case is epitomized by a teacher investigating how he or she can create a small digital educational game for use in the classroom. The exemplified group of users does not have programming skills or experience in game development. Authoring tools for games, analogously to authoring tools in the field of e-learning, allow a non-technical expert to compose content (such as images, sounds or videos) into a game by specifying the kind of game to create and then integrating the content. An example is the authoring tool StoryTec previously presented by the authors. In this paper, an extension to the authoring tool StoryTec is described, which is intended to assist non-programmers and novices by offering specialized authoring functionality for the integration of content into gameplay templates. These templates are based on the software engineering paradigm of component-orientation, resulting in a number of rich templates that are offered to the author during the game creation workflow in order to facilitate the authoring process. They provide authoring capabilities specialized for certain highly dynamic or complex gameplay types, which would be cumbersome or impossible to author using general-purpose authoring functionalities also found in StoryTec. In further steps, the components can be augmented with more information, for example metadata about their usage in order to help authors understand them better or wizards which assist novice authors in correctly and efficiently filling out the gameplay templates. A

first implementation of a gameplay template was chosen based on the analysis of the authoring process of a "city rallye"-type game which involves learning about the target city in order to advance the game. This template was implemented and the authoring effort as well as the complexity were evaluated, yielding in the result that an equivalent game (with the same content) could be authored in a smaller amount of time and with reduced complexity.

Keywords: component-based software engineering, authoring tool, Serious Game

Pass go Quickly: Use of a Board Game to Provide Efficient and Effective Training in Course Design Concepts

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Abstract: Instructional design, and wider course design, issues are difficult to introduce to academic and administrative staff without training, numerous meetings and a willingness from the staff members: which is costly; often reduces the time available for course design itself, or reduces the quality of the course and causes later problems in delivery. A board game designed to provide a familiar context to the players, and mimicking the course design process as a fun turn-based activity (utilising game design elements of narrative, competition, reward, and replay value) was created, playtested by both gamers and non-gamers, and pilot versions produced. If successful, the game would provide a cheap and effective replacement for up to four meetings and a significant amount of the instructional designers' time at the start of any course design process; without replacing the most important aspect (the design process itself). The pilot game was tested with sample course teams, and then used in two actual course design processes. Staff reflections on the effectiveness of the game are presented here, from interviews with both players and observers. Principles behind the design, and a discussion of the use of games to set authentic contexts quickly, are presented to formulate a strong case for the use of games as cheap replacements for other, long-winded processes in education and training.

Keywords: games, education, course-design, boardgame, instructional-design

Massively Multiplayer Online Games as Activity Systems: The Relationship between Motivation, Performance and Community

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Abstract: This paper presents the results of a recently conducted research that explores Massively Multiplayer Online Games (MMOG) form a psychosocial perspective. More specifically, this paper includes the empirical findings of the research which used quantitative analysis techniques to investigate the relationship between physiological factors in MMOGs, such as sense community, performance and intrinsic motivation. In order to understand the reason why MMOGs are so popular to people, and especially to students, a research was conducted in a population of students who play a popular MMOG, called World of Warcraft (WoW). The findings of this research revealed that the ability to create groups and develop a sense of community in a game is motivating for the players. Moreover, the sense of belonging in a community was positive correlated with the players' performance, implying that the performance of a player can be enhanced when the sense of community in a game is strong. These findings suggest that the development of groups of players in a game is possible to increase intrinsic motivation of players and enhance their performance in the game. Therefore, the contribution of this paper to games-based learning research is that it provides empirical results for the reason why MMOGs, such as WoW, are so popular to people: it seems that the players' ability to form groups and develop a sense of belonging in them intrinsically motivates the players to play and perform well in these games. These results dignify the need for creating educational multiplayer online games and propose a conceptual framework based on the theoretical framework of Activity theory. This theoretical framework is used to highlight the importance of developing motivating educational multiplayer online games that that are truly engaging, by developing a strong sense of community among players, which could intrinsically motivate students to participate in them.

Keywords: Massively Multiplayer Online Games (MMOGs), education, sense of community, intrinsic motivation, activity theory, World of Warcraft (WoW)

Edutainment in Virtual Environments: An Academy Supporting Collaborative Learning in Second Life

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Abstract: Second Life (SL) is a digital game and a Collaborative Virtual Reality Environment. The "unofficial" Academy of Athens is a space in this environment. This space, or "land" according to SL terminology, was created by the group "The Power in unity", in order to create a Greek learning SL community to offer distance courses and events for Greek SL users and teachers. Accordingly, the Academy wiki was created in order to provide relevant information to the users. An experimental implementation of the educational use of SL is presented within the context of this paper, along with considerations, results, conclusions and future work. Initially, the group of the Academy was created simultaneously with the configuration of the roles which every member had in this group. Then, the SL land in which the Academy would be hosted was looked for. The building was designed to resemble the real life Academy of Athens. The foundation of this Academy targeted the Greek SL users. Already existing ones were approached by organizing Virtual Educational Events in order to get them accustomed with the environment of this virtual world and to familiarize them with the courses which were created for both new and more experienced users. Greek Teachers showed interest in attending virtual courses on educational issues. Discussions on topical issues of real life and their relationship to avatar lives won the interest of all the Greek SL users. A museum and galleries were created within the building of the Academy and the lands around the building were upgraded for the cultural interest of its visitors. Throughout the whole implementation but also during its current use, the virtual environment of SL gave users such a pleasure it raised concerns about its addictive nature. The danger of the possibility real life being absorbed or replaced by virtual life is also discussed within the context of the paper presented, forming concrete conclusions as to how a virtual environment facilitate Education and Learning and how can one control its use.

Assessing Game Experiences Caused by Educational Collaborative Game

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Abstract: This study is part of the larger Game Bridge project, which investigates the potential and challenges of designing and implementing 3D-learning games for Computer Supported Collaborative Learning (CSCL). In this study we concentrate on players' game experiences caused by the educational collaborative game "Game Bridge." More specifically we assess players' game experiences using both subjective (self-report measure) and objective (physiological responses) research methods. Our aim is to provide cross-validated descriptions of the emotional experience of players during game-play. Thus, we combined knowledge of supplementary methods, integrating metrical game data with other user experience measures such as psychophysiological methods, usability methods and surveys. The aim is to link game experience directly to the game design elements and to improve the quality of educational games. The results indicated that players' game experiences were fairly positive, players felt happy and enjoyed playing the game. Additional results showed that players felt competent and the game was not particularly challenging. Moreover, players felt a certain degree of immersion and flow. The puzzles of the game were designed to require effort and commitment from several players for successful completion. Our conclusion that we achieved this goal is supported by the fact that there was strong behavioral involvement among players and that player's felt empathy towards each other. Given the nature of the game it should be noted that positive feelings and behavioral involvement were strongly associated with the feelings of competence. This shows that group dynamics and team spirit are important parts of multiplayer game experience and are associated with feelings of competence. Players' physiological responses during the game revealed that playing the game increased the level of players' emotional arousal compared to the rest phase. Results also showed that players' arousal state varied greatly during the game, but it should be noted that changes in arousal state were unique and varied between the players.

Keywords: collaborative learning game, game experience, heart rate variability, game design

Can we use Existing Pedagogical Specifications to Design Mixed Reality Learning Games?

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Abstract: Game-based learning is one efficient pedagogical concept that uses game principles to incite learners to engage into learning activities. Learning games are commonly known as digital environments. In the mean time, new technologies have been increasingly developed, thus providing new perspectives in game-based learning, particularly, mixed reality technologies that merge both real and digital worlds. For instance, they are widely used in mobile learning or learning with tangible interfaces. For the latter, mixed reality technologies make collaboration easier and provide better feedback to users. We present in the paper a brief study on the state of the art of mixed reality technologies. While the technologies have been experimented in educational settings or in games, they are used only in few learning games. Some research efforts have proven positive outcomes of the latter in learning even they are not widely applicable. Based upon the contributions of mixed reality in learning games, we point out that means employed by designers are as crucial as the pedagogical objectives. Therefore, they have to be taken into account during the design process. Our research efforts aim at providing tools and methods to support the design of mixed reality learning games (MRLG). One of the first steps during the instructional design is to write the learning scenario. However, there is no universal method to be used in the design process. Thus, in the second section of this paper, we analyze the ability of existing pedagogical specifications to model mixed reality learning games scenarios. In this view, we compare IMS-LD, LDL and ISiS, which all intend to assist pedagogical designer and teachers in the design of new pedagogical activities and in the formalization of existing ones. Design process of MRLG includes game elements and mixed reality technologies design, particularly in the pedagogical scenario writing. Meanwhile, the specifications mentioned earlier do not fulfil our needs: they all allow a representation of a pedagogical scenario in a workflow, but in our case, a more detailed description of the workflow is needed. The specifications are not suitable to describe the used technologies or the way they are used. Regarding the fun factors, none of the formalisms includes the description of rules and neither game principles nor game objectives. The last part of the paper discuss different proposals: an extension of a pedagogical specification, a combination of existing specification with a task model for more detailed description, and a new pedagogical specification for mixed reality learning games.

Games' Usability and Learning – the Educational Videogame BeTheManager!

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Abstract: This paper presents the use of the videogame "BeTheManager!" - a game that has been created by Software Quality Research Group (SQRG, 2009), which simulates the management of an informatics project and simultaneously "teaches" software technologies - in order to measure how the usability of a game is related to "knowledge acquisition" during playing. The paper briefly presents Adapted Heuristic Evaluation (AHEV) a method used for usability evaluation and a combination of methods which have been used in order to measure "knowledge acquisition". The research looks into the particularities of educational videogames, in respect of the way the whole usability evaluation procedure is affected, and proposes a composite evaluation technique that is suitable for such cases. We measured the perceived game usability of sixteen players of various levels of "programming" experience and the results -compared with knowledge acquisition- have revealed that knowledge acquisition is dependent to a certain extend on game usability, but also it depends on users' previous experience in programming. It also presents the data from the sessions involving 16 users and the discussion regarding games' educational value in relation to their usability, as well as our final conclusions.

Best Practices in the use of Managerial Simulation Games-Based Learning

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Abstract: Computer simulation games represent an efficient teaching tool supporting comprehensive approach to problem solving. Through experiential education, students are supposed to assort present knowledge and at the same time they pursue consequences of their decisions by realization of interactive game. Learning process is based on feedback between implemented student activities and his results achieved during the game. Shared experiences of the student teams, emerging either in the interaction

among the team members, as well as among the other teams help to develop student skills. Computer simulation games in the learning process are an active teaching technique for acquiring knowledge. In the case of simulation games we are able to describe generally valid behaviour of particular steps and aims. Game fundamental is forming the virtual firm including determining roles in the created teams. By the managing the virtual firms the team decide about settled parameters in concrete simulated situation. After each round decisions made by teams are automatically evaluated including rank of competing teams. Underlayment for correct decisions of the teams is reports. The aim of the teams is to manage virtual firms so that they defeat the other teams. It means that the best virtual firm is the firm which acquire the highest level of performance index. The goal of the paper is to evaluate the benefits of managerial simulation game used in the teaching process of rules of economic laws of the market. A probe in 2010 and 2011 in form of a questionnaire survey was chosen for the evaluation. Managerial simulation game Strategic Corporate Management is used as a practical example used in teaching process and is included in the paper. It simulates economic phenomenon and conditions which the student have to take into account in managing a virtual company in concrete industrial branch. The game is based on developed Strategic Corporate Management Model that is derived from teaching best practices and created by using software program Vensim. This program is intended for forming the managerial models and simulators resulting from modelling the dynamic systems. The paper is based on conducted probe of managerial simulation game benefits for students and a practical example of activities in the field of managerial simulation games and teaching experience in the teaching process.

Keywords: managerial simulation games, comprehensive approach, learning process, experiential education, modelling the dynamic systems

User Centred Design and Development of an Educational Force-Feedback Haptic Game for Blind Students

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Abstract: Integrating game technology into education and learning has had some significant impact on children's learning and cognitive processes by helping to make learning an even more enjoyable experience. The use of technology in the education of blind children has also shown positive and beneficial effects. The emergence of haptic technology and the opportunity of creating interfaces for non-visual audio-haptic interaction have opened the

door to digital graphics and 3D models by blind users. This paper describes the development of a design framework of an educational force-feedback game for blind and visually impaired students to enable them to practise and learn about 3D objects in free space. Ultimately this is a step in the process of developing games that enable blind students to playfully learn the more complex mathematical concepts that appear to need a visual understanding such as geometry and the use of graphs. The design of this game has been derived from the end users' expectations and requirements. The final aim is to use the same rendering pipeline that is used in the haptic exploration of real objects. A user centred design approach is used to prepare a detailed specification of virtual learning environment (VLE) and review prototype development using the Novint's Falcon. The involvement of educators and parents in the design process is crucial and beneficial but in order to understand and identify the end users' needs and expectations and therefore implement concepts optimally, it is vital to involve the target users themselves in the design process. This paper thus presents results of experiments with blind users and interviews with them, their parents and teachers to establish the design framework. It goes on to discuss the initial findings gathered from the testing phase made on the manipulation and recognition of primitive 3D objects by a focus group and highlights the improvements that need to be made. An initial experiment with the game interface is also introduced.

Keywords: component; computer games; visually impaired people; haptic technology; force-feedback; virtual learning environments; Novint's Falcon

Educational Applications of Serious Games: The Case of the Game Food Force in Primary Education Students

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Abstract: This paper refers to the utilization of serious games for educational purposes and reports a case study on the use of *Food Force* serious game as a learning tool in elementary education. The paper presents initially the theoretical documentation of the research rational using literacy review of the integration of serious games in education. Then the research project is presented, aiming at investigating the learning effectiveness of the serious game called Food Force in knowledge construction about humanitarian aid to areas of the planet facing starvation problem as well as the contribution of the game to changing students' attitudes and perceptions towards the global problem of hunger and the acceptance by students and attractiveness of such a game. The research gives evidence that Food Force game gives no significant different results in knowledge construction in comparison to

modern pedagogical interventions without the game but contributes significantly to attitudes and views of students and the engagement of students during learning making the learning process significantly more interesting and motivating for them.

Serious Games in Formal Education: Discussing Some Critical Aspects

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Abstract: Innovation in technology together with evolution in pedagogical approaches is encouraging increased integration of technology-supported interventions in mainstream teaching practices. One area attracting particularly close attention in this respect is Serious Games (SGs), which offer considerable potential for facilitating both formal and informal learning experiences in supported and standalone contexts. Advances in technology and in technology enhanced learning are raising learners' expectations for immersive and engaging game-based experiences. This trend is underpinned by the emergence of young learners adept at using digital technologies and the internet; there is an attendant risk that, as students, they may be alienated by traditional education and its failure to engage them fully in a lifelong learning process and prepare them adequately for the challenges of the 21st Century. SGs would appear to offer an attractive solution in this regard. However, there are a number of inhibitors preventing their wider take-up in mainstream education, with the result that the considerable potential on offer has yet to be fully exploited. This situation is the background for the joint efforts of partners in the Games and Learning Alliance (GALA), an EC-funded Network of Excellence on SGs, especially the sub-group dedicated to the pedagogical dimension of SGs. In its discussions on the key challenges for more wide-scale and effective SG use, the group has focused in particular on aspects related to the central role played by the educator in formal education

settings. Specifically, discussion has focused on the challenges posed when educators are called on to modify their practice, adopting the new roles and approaches demanded for effective SG deployment. This paper presents the outcome of the group's exploration. It frames the question of the educator's central role by drawing on research work that, in the view of the different authors, embodies the major references for shedding light on this multi-faceted aspect. As well as the new role that the educator assumes in games-based learning environments, particular attention is also dedicated to the innovative pedagogical approaches that can be applied to SG deployment, especially those inspired by peer collaboration.

Teaching Information and Communication Technology With Digital Games

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Abstract: It has been argued that digital games serve in the areas of cognitive, emotional and social development of children in similar ways as their traditional counterparts while they motivate pupils by engaging them in the learning process through activities related to their interests. We propose a teaching approach for familiarizing pupils with the technical and morphological features as well as the cognitive and emotional impact of digital games, by using the games themselves as the main teaching objective, thus obtaining a familiar and enjoyable environment for pupils. Another dimension of the teaching objective vector refers to Information and Communication Technology (ICT) and media literacy skills. What's more, students learn to express logical thoughts based on gathering and processing information procedures that resemble to scientific methods of reasoning, as well as engaging them in self evaluation and reflection activities. In specific, there are tasks for developing cognitive, emotional and social aspects of pupils personality. What's more, we propose a set of tasks for allowing students to evaluate and refine their conclusions through reflecting on the path they followed as well as the emotions that affected them. Based on the ground of social constructivism, our approach encourages pupils to participate in guided collaborative groups where they explore the world of gaming, supported by ICT tools that are provided and mastered when needed. The same tools are used as means of assisting pupils in constructing answers to their research questions, as well as in realising their creative ideas. Teacher acts mostly as assistant and motivator. The proposed activity

is organised in flexible tasks designed for groups of pupils and defined clearly by the teacher. Each task is modified by the teacher to match the pace and the capabilities of each separate team. Evaluation is performed by the team members, the classroom and the teacher in various phases of the activity and refers to cognitive goals and collaboration skills.

Engaging Students in Developing a Stereoscopic 3D Educational History Game

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Abstract: The aim of this paper is to present an educational history game the creation of which engaged students in the actual developing process of a stereoscopic 3D environment. We believe that designing and using a stereoscopic 3D learning environment is important because it helps students establish a spatial way of thinking. This kind of skill does not appear in most of the curricula subjects, even though evidence appears in the literature that it can be really helpful in our students' school and everyday life. Besides that, this game enhanced our students' IT skills and their knowledge of an ancient Greek era, in terms of the history subject taught in the first year of middle school. The design of the educational game presented is based on the Greek ancient history curriculum as taught in middle-school with a connection to ancient Greek literature, that is with Homer's "Odyssey". The first period designed and examined is the Mycenaean one, but we hope that students will expand the game to other eras of Greek history. The game is about decision making and the ultimate goal is to find the "mistakes" in each era (these are of several types, as in objects, every-day life situations etc.). Finally, the educational value of the specific game is to be found in two levels. First of all, second and third year middle-school as well as high-school students were involved in the design of the game (and thus were the actual creative interactive media producers). In addition, students helped in the process of development of the scenarios to be presented, a fact that allowed them to evaluate their historical knowledge. On the other hand, first year middle-school students were the ones that played the game and checked the knowledge acquired during the specific academic year.

Reflective Flow in Digital Games

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Abstract: The aim of this paper is to present a theoretical framework for experiential learning through digital games based on the quality of experience: what kind of learning can and does happen with digital games? Kolb (1984) defines experience as the source of learning and describes the learning dynamic as a cycle in which two main dimensions interact: the grasping of experience, which develops between the concrete experience (apprehension) and abstract conceptualization (comprehension), and the transformation of experience, which develops between reflective observation (transformation via intention) and active experimentation (transformation via extension). Csikszentmihaly (2002) inquired the quality of experience and identified nine core dimensions that characterize the "flow" experience. These theoretical models provide the framework to understand the high quality of the digital game experience. One main issue arises: the role of the self. In the reflective observation and abstract conceptualization phases of Kolb's model the self plays a fundamental role as the focus at which the reflection is aimed and from which the conceptualization begins. On the other hand, the flow theory underlines that with a high quality experience the self tends to disappear in the activity. This paper is aimed at trying to explain this apparent contradiction. We carried out an empirical study with a sample of adults (213 subjects) who were administered a questionnaire on gaming habits and conceptions about digital games and learning. The second step of our project involved 72 subjects who were asked to play a digital game and, afterwards, fill in a questionnaire about the quality of their experience and their skills improvement. A few days later, multiple focus groups were held to discuss the experience with the digital games. Empirical evidence in our study confirmed that the higher the quality of the experience, the higher the perception of growth in one's ability. Nonetheless this general feeling, an explicit reflective activity is required for the player to be able to specify the area and the extent of the improvement. As far as the possibility to transfer the skills acquired and developed with digital games to other fields is concerned, a reflective approach comes to be even more fundamental (Tardif, 1999). The second aim of this paper concerns the ways to integrate a reflective dynamic in a flow experience without straining the ecology of the play situation. Educational proposals will be discussed.

Keywords: digital games, experiential learning, flow, reflective approach

An Analysis of the Motivations for Playing Computer Games in a Secondary Education Context: A Comparison With Higher Education

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Abstract: Computer games are considered by some educationalists to be highly motivating and engaging by incorporating features that are extremely compelling. Computer games build on theories of motivation, constructivism, situated learning, cognitive apprenticeship, problem-based learning and learning by doing. The fields of games-based learning and serious games suffer from insufficient empirical evidence supporting the validity of the approach. To address this, this paper will present the results of a survey carried out at a secondary school in Greece (Experimental School of University of Thessaloniki) to provide some empirical data on the motivations for playing computer games and the motivations for playing computer games in secondary education. This paper will compare the motivations for playing games in a general context and an educational context and will also compare the motivations for playing computer games at secondary and higher education to ascertain if there are any differences. The results of this study suggest that the most important motivations for playing computer games in Secondary Education are pleasure, cooperation and competition. This paper will present valuable empirical evidence in the field of games-based learning and will provide guidelines on which particular motivations to focus on in a secondary education context.

Keywords: empirical evidence, secondary education, intrinsic motivation, attitudes

Teachers Roles in Serious Games: Incorporating Serious Games in the Classroom of Students With Intellectual Disabilities

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Abstract: In this paper we revisit the belief that when using a serious game in the classroom, a motivating game used by an open minded teacher, will be more than enough. What we tend to forget is that in order to achieve integration to the educational setting, both the educator's needs and the students' abilities, should be taken into consideration. The purpose of this

communication is to present a series of observations made by researchers and educators on the incorporation of serious games in the educational experience of users with intellectual disabilities.

A Survey of Students' Improved Mastery of Game Playing Skills Through Informal Online Game-Based Learning

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Abstract: The popularity of Massively Multiplayer Online Games has stimulated researchers to investigate the factors which contribute to the apparent success of learning communities and processes within those virtual environments, and whether those factors which contribute to that success can be transferred to pedagogical practice within formal learning environments. This paper reports a survey of the game playing behaviours of University students, including the frequency and nature of their online communication in relation to increasing mastery of game play. The survey found that respondents employ a range of methods to increase mastery of game playing skills, and that there was a significant relationship between frequency of online communication and level of mastery of game playing skills. More frequent online communication is associated with higher levels of mastery of game playing skills.

KanjiLearningLab: Memorizing Kanji in a Playful Way

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Abstract: The Chinese writing characters as used in modern Japanese are called *kanji*. As a foreign language learner with an alphabetic-language background it is very difficult to learn kanji as it requires an enormous memory load to memorize the extensive amount of information embedded in the script. In this paper we describe the design and evaluation of

KanjiLearningLab, an online game prototype that aims to simplify the task of memorizing the meaning of 150 basic kanji. To facilitate the learning process, the game uses mnemonics that are supported by illustration and animation art work, as well as mini games and examinations as a tool to review the newly acquired kanji meanings. We have tested KanjiLearningLab with 136 learners of Japanese as a second language between 10 and 30 years old. All students played for three to four sessions, each session lasting between 45 and 75 minutes. The preliminary results show that the students had mastered on average 36 (for the youngest students) to as much as 133 (for some of the adult students) new kanji, measured as the difference between a pre-test and a post-test. As a comparison, during their first year of Japanese study the younger students are introduced to 30-40 new kanji as well as 100 alphabetical letters. It should be noted that this also includes learning how to write and pronounce the kanji. Finally, teachers indicated that they were very interested in adopting the game in their future teaching if the game were expanded to 400-500 kanji and re-designed to offer more customizable features. In that way they would be able to use the game as a complement to their regular teaching material. We conclude that KanjiLearningLab has potential to become an enjoyable and effective tool for kanji learning, both in and outside the classroom. We therefore aim to further develop the prototype into a commercial application.

Keywords: Kanji, memorizing, game, mnemonics

The Effectiveness of Game-Based Learning on Students' Mnemonic Techniques and Perceptions

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Abstract: Many researchers pointed out that computer games are widely accepted as a powerful alternative to traditional ways of teaching and learning. Learners can learn through exploration, analysis of problems, accomplishment of tasks, and overcoming challenges in a game context. In simulated game contexts, learners are required to make quick decisions, including planing, managing resources, and taking immediate actions. Previous studies have showed that game-based learning can enhance students' attitudes, motivation, knowledge, and higher-order cognitive skills, such as metacognition, thinking skills, and problem solving skills. However,

the studies related to the effectiveness of game-based learning on learners' mnemonic techniques were few. Previous studies have showed that information could be transferred into long-term memory through a number of mnemonic techniques, including multiple coding, method of loci, keyword method, subjective organization, and contextual facilitation. Mnemonic techniques can be further divided into visual and verbal mnemonic techniques by how information is structured in the brain. The main purpose of this study is to investigate the effectiveness of game-based learning both on students' visual and verbal mnemonic techniques and their perceptions towards game-based learning. The design of this study was the nonequivalent pretest-posttest quasi-experiment design. There were fifty-three students aged from 20 to 24 participating in this study. The students were distributed into the experiment group and the control group. The experiment group involves twenty-nine students, and the control group twenty-four. The experiment group played three Flash-based puzzle games designed by the researchers for teaching the mnemonic techniques of method of loci (visual), number/rhyme method (verbal), grapheme-based method (visual), and link mnemonic method, while the control group received the traditional lecture-based instruction. After three weeks, both the scores of the posttests of the Spatial-Span Task (visual) and that of the 20-noun Memory Test (verbal) of the experiment group were significantly higher than the scores of the pretests of the control group using ANCOVA. This finding confirmed the effectiveness of game-based learning on students' mnemonic techniques. After interviewing the students about their perceptions toward game-based learning, they indicated that the game designers should balance playfulness and educational purposes. Additionally, this study also shows that immediate feedback to learners is one of the most important elements in game-based learning. Implications and suggestions were also provided in this study.

Keywords: mnemonic technique; computer game; interactive learning environments; teaching/learning strategies; game-based learning

Game-Based Assessment and the Effect on Test Anxiety: A Case Study

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Abstract : The goal of this study was to investigate whether test anxiety in the summative assessment of first aid knowledge can be reduced by using a game instead of a traditional exam as assessment instrument. More than 200 high school students (grade 11 and 12) participated in this study. All students were enrolled in a first-aid related course being part of their school

curriculum. Test anxiety was measured twice using the Test Anxiety Inventory (TAI) at the end of a test moment: prior to the first aid course (pre-TAI) and at the end of the course (post-TAI). Based on the pre-TAI results students were equally assigned to two groups: a game-based assessment group and a traditional test group (control group, assessment by a paper-and-pencil test). In both formats students acted as judges of other students' efforts (peer-assessment). In the pre-TAI (immediately following a random test), students scored an average of 45.32. In the post-TAI, students scored a total average of 38.29 in the game-based assessment and 43.93 in the traditional test condition. No significant difference was found between the mean scores on pre- and post-TAI in the traditional test condition (p = .317). Results indicate a significant effect of the game-based assessment on test anxiety (p = .000). From this case study we conclude that games' inclusion in formal assessment can result in a more positive psychological well-being which -according to the literature- might lead to higher academic achievement.

Keywords: game-based assessment, health education, test anxiety, secondary education, vocational education

Settings Goals in Psychology Serious Game for Preschool Children

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Abstract: The term serious game is generally used for an application that is developed using a computer game technology and game design principles but is used for non-entertainment purposes. We can say that these applications are entertaining games with non-entertainment goals. The idea is that games could be used for more serious purposes such as education, simulating real world phenomenon and relations in the world, increasing life quality through health, rehabilitation and therapy applications or raising interest in the problems in our global world. This paper focuses on psychology serious games. Generally, in psychology games users are represented by their avatar and can interact with the world and other game characters. Like in storytelling or bibliotherapy, the story itself has a therapeutic component so much as it evokes identification, empathy, resistance, opposition and disclosure of many confusing emotions. This goal oriented gaming can be used in goal oriented therapy methods. The game is played according to a scenario where the user can observe and react to different situations. This acts as a powerful tool for helping users understand and reflect on their own behavior and gives them the opportunity to learn from this virtual experience. The next stage is testing the user's new abilities with

new situations by applying different games goals. The innovative use of computer in the form of psychotherapeutic games may enhance patient cooperation. This can also help to attract and sustain the interest especially in children. This paper describes the main features of serious games used in psychology based on the prototype of the game *Mission - Master Your Fear*. This is a serious game based on a specialist scenario founded on bibliotherapy with some therapeutic goals. It deals with issues and problems of preschool children. The result is an interesting and absorbing game for children which may help them solve some problems.

Keywords: goal-oriented games, serious games in psychology, informal learning

Designing a 3D Collaborative Game to Support Game Based Learning

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Abstract: The main goal of this paper is to provide educational game designers with a design model for the development of 3D virtual collaborative games aiming to utilize the advantages of 3D immersive environments. The proposed design model is presented through a detailed 3D collaborative game scenario, appropriate and suitable for implementing educational games in virtual immersive environments. Thereby this paper presents a proposal to support collaborative learning based on 3D serious games.

Keywords: 3D virtual game based learning, virtual learning environments, computer supported collaborative learning, 3D collaborative learning game design model, serious games

The Synergy of Three: Incorporating Games, Multimedia and Programming in Order to Improve Algorithmic Skills

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Abstract: Nowadays, using interactive video and computer games for educational purposes has become a popular subject of study. Recent empirical studies underline the fact that video games may contribute to the educational process. As programming and logical reasoning are concepts that quite a few high school students find hard to cope with, alternative

approaches of teaching them should be explored. The use of Rapid Digital Game Creation (RDGC) for developing Computational Thinking (ComT) skills moves away the frame from simply getting programming knowledge on a specific language, having previously spent a large amount of time in the learning of its syntax, and gives students a boost while stimulating them through the development of interesting applications. Such interesting applications are games, as they can give students the opportunity to experiment their knowledge and to develop ComT skills, while at the same time can have fun. This paper presents an approach to incorporate games, multimedia and programming in order to motivate, help understand and improve analysis, synthesis and algorithmic skills. This approach took place as part of the educational process in a high school class with children at the age of 17-18 years, during "Multimedia" course. According to this approach, two types of projects were used. Firstly, a simplified demo version of a well known game was presented, and students had to reconstruct it from the beginning, with the same functionality. In the second project type, the rules of the game and the description of the behavior of the various actors in natural language, along with a demo version of a new game were given to them. The students were asked to reproduce the given demo, by using the RAD environment. This paper also presents a study that came through a process of an evaluation questionnaire answered by the students.

A Case Study in Educational Game Designing: Junior Chemists in Action! An Educational Live Action Role Playing Game (LARP) Analysis With a Computer-Based Learning Element

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Abstract: The case study paper reflects upon the designing and realization of *Junior Chemists in Action!,* an educational Live Action Role Playing Game (LARP) containing a computer-based learning element. *Junior Chemists in Action!* was presented at the National Hellenic Research Foundation in February 2011, as part of the events dedicated to the Year of Chemistry. The intention of the game was to introduce participants (children, aged 6-12 years old) to the Science and History of Chemistry. The educational game received the support of British Council. It ran twice and was attended by approximately 95 children. The feedback received by the organisers and parents was very good and the children's engagement with the game proved out to be very satisfactory. The paper starts with a short introduction about the position of Role Playing Games and specifically LARPs in Education in Greece as well

as with an explanation of how the educational LARP *Junior Chemists in Action!* may be considered innovative. A reference to the current interface change in Greek School Education along with a comparison between factual and processual knowledge in contemporary educational practice are then made. In addition, the educational theoretical framework of *Junior Chemists in Action!* is discussed, especially with regards to Piaget's constructivist and Vygotsky's cultural-historical approaches. A presentation of the ways the game was designed to trigger cross-contextual use of knowledge is attempted. A thorough analysis of the game follows, which includes design principles, goals, game objectives and core features amongst other parameters and an extensive description of the game-play process. The computer-based learning element receives emphasis in the analysis, with regards to its designing and gaming/learning functions. A short evaluation on the actual game realization brings the discussion closer to an end. In conclusion, the connection between playing and learning within an educational LARP frame and virtuality is underlined.

Keywords: educational games, Live Action Role Playing Games (LARPs), chemistry, computer-based learning, teacher as performer, immersion

Digital Games Evaluation and Educational Assessment - a Review and Proposal for an Open Methodological Framework (OMEGA)

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Abstract: This paper aims to address two main goals: (a) to present the results of a literature review, regarding existing evaluation and educational assessment procedures of digital games; and (b) to propose an open methodological approach concerning the educational assessment of digital games (OMEGA), based on the findings of the literature review. This research aims at building, gradually, an open framework for evaluation and assessment methodologies on educational digital games. Moreover, it attempts to bring together game designers, educators and players into a common effort, regarding the issues involved. The starting point for architecting such an open methodological framework is a set of concepts pertinent to educational interventions; lesson plans constitute the core of this approach, whereas the educator, player, game and context perspectives also play an equally significant role, interacting with each other in a number of ways.
Keywords: digital games-based learning (DGBL), evaluation, educational assessment, open frameworks, methodologies

Alleviating the Entrance to Serious Games by Exploring the use of Commonly Available Tools

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Abstract: Despite the continuous and abundant growth of the game market the uptake of serious games in education has been quite limited. The uptake of serious games is seriously hampered by the general impression that games require complex technologies and that games are difficult to organise and to embed in the curriculum. Moreover, the education of future teachers and teaching consultants pays limited attention to the use of new technologies. This paper explores to what extent game templates can be designed that can be easily adopted and adapted by individual teachers and that only use commonly available tools in order to leverage the adoption of serious games. It discusses the design and first evaluation of two of such games: Argument, based on a Wiki, and StreetLearn, based on the Google App StreetView. Argument, a text-based game, has been used in a trial by students, in the role of teachers, of a Master of Learning Sciences Programme. Based on the experience of the Wiki game, StreetLearn, was designed. It goes beyond Argument by offering an easy way to include 3D-facilities in a serious game. The initial design of StreetLearn has been reviewed by teachers with a cultural science background and researchers in the field of technology enhanced learning. The results of the studies indicate that both tools are useful instruments that can be operated by the teachers themselves to build game and game-alike educational activities and, additionally, are a valuable step to gain experience with serious games.

Keywords: serious games, Wiki-games, Wiki, Google StreetView, teacher training

Using Video Games and Brain Training Software to Modulate Human Time Perception

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Abstract: Temporal processing of events allows us to detect, respond, and make sense of the various aspects of our daily life. Given the importance of this percept, researchers have formulated various models in order to account for the way we perceive time and make temporal duration judgments. One such model is the Attentional Gate Model (AGM), where processes such as

attention, working memory, and processing speed, define each person's time percept. One, thus, wonders how refinement of these processes may affect an individuals' temporal percept of the world? In order to examine this question, we utilized video games and brain training software that are hypothesized to modulate working memory and processing speed, in order to train participants and, thus, refine their temporal processing. Specifically, participants were asked to perform a production and a reproduction dual task by performing a temporal (time estimation) and a non-temporal (identification-naming of Greek letters) task simultaneously. According to the AGM, dividing attention to two different tasks will differentially affect production and reproduction dual tasks. In the production task, dividing one's attention should lead to duration judgments which are longer than the actual time intervals presented, while in reproduction divided attention will lead to underestimation of the durations presented. The participants in our study were randomly assigned in one of three experimental groups. Participants in Group 1 were trained for thirty days using an action video game, which according to previous research will lead to an increase of processing speed. Participants in groups 2 and 3 were trained using brain training software at improving working memory and processing speed, respectively. Participants were asked to perform the dual tasks before and after the thirty-day training period. Given that video gaming and brain training software actually do increase processing speed and improve working memory, we expect that participant's performance in the dual tasks at post-test will be different than that on pre-test. Specifically, we hypothesized that improvement of working memory will lead to a loss of fewer pulses during encoding phase and as a result to increased time reproductions. Accordingly, increase of processing speed, should lead to the accumulation of a greater number of pulses, and as result to shorter time productions. A statistically significant result was detected for the reproduction task. Participants were significantly more accurate in reproducing target duration in post-testing as compared to their performance in pre-testing. Further replication of these results will, for the first time, provide evidence of refinement of human time perception through the use of video games and brain training software which will lead to important applications for elderly and neurological cases suffering from time distortions.

Keywords: time perception, reproduction, video games, brain training

What Happens off the Field? Proposing a Rhetorical Approach of the Affinity Spaces Surrounding Games

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Abstract: This paper considers the relation between literacy, social media practices and rhetoric, by focusing on game-related spaces as sites for learning. Studies from various disciplinary research domains like anthropology (e.g. Ito and Bittanti 2010) and socio-linguistics (e.g. Gee 2003) connect games and learning. Gee (2003) provocatively claims that games can be considered more powerful learning environments than traditional education. He attributes several learning principles to gaming, thereby also calling attention to affinity groups "bonded primarily through shared endeavors, goals, and practices and not shared race, gender, nation, ethnicity, or culture" (Gee 2003: 197). These observations are supported by recent research that has provided evidence for the ubiquity of learning in the digital spaces where people form affinity groups, like games and the spaces surrounding them (e.g. Steinkuehler and Duncan 2008). Earlier explorations of communities and learning practices (e.g. Anderson 1983; Bey 1991; Pratt 1991) supports Gee's (2005) claim that the relationship between membership and learning should be approached cautiously. This paper claims that rhetorical theory can offer substantive insights in the world of gaming and learning. Based on the theoretical insights of game scholars like Frasca (1999), Bogost (2007), and Voorhees (2009), this paper proposes to broaden the scope of research to the affinity spaces outside of games and to analyze the interactions within those spaces from a rhetorical perspective. A small but growing body of research relates the study of video games to the theory of New Rhetoric. Here, rhetoric should not be defined merely as an act of persuasion through language, but a means for meaning making in a world of symbols and interactions (Herrick 2004: 223). Based on insights from New Rhetoric, and Kenneth Burke in particular, the concepts of circumference and identification are introduced as a means to widen the analytical lens (Kimberling 1982). Brief examples from discussion forums for *Fifa 11* are used to illustrate the conceptualizations.

Keywords: affinity spaces, new rhetoric, video games, circumference, social media, identification

Digital Games in an age of Austerity

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Abstract: Computer games can provide active and experiential learning environments, supporting problem-solving and collaboration, providing a forum for practice and learning through failure. Through scaffolding and immediate, contextual feedback, they can facilitate the transition from novice to expert. They can engage users, with mechanisms such as the use of compelling challenges and rewards, competition, satisfying curiosity and the human urge to complete sets. Above all, they can provide safe playful spaces for mistake-making and reflection, in which learners can experiment, build things, create mythologies, and have fun. However, obtaining or developing appropriate games for formal educational contexts is often problematic. Commercial games may not map closely to desired curricula, while bespoke games are typically time consuming to develop and require specialist skill sets and expertise. Digital games are often expensive to purchase or produce, and learners – particularly those in Higher Education, an increasingly expensive proposition in the UK – need to be convinced of their appropriateness and value for money. While the use of digital games for learning can be effective, it may not be practical given the increasing economic constraints, and this paper aims to present alternative ways in which the theory and practice of computer games could be used in education. Three alternative approaches to game-based learning without the expense will be presented. First, the option of developing lo-fidelity games, such as alternate reality games, or using virtual worlds or one of the growing number of accessible game-builder toolkits to create game-based learning experiences. Second, the notion of learning from games rather than with them is discussed, by examining what games are good at and how they achieve it, and looking for ways to embed those elements in traditional teaching practices. Third, the option of giving learners agency as creators of games rather than as consumers is presented, so that they become the developers and it becomes the process, not the product, that facilitates learning. The appropriateness of each of these approaches will be considered, and the advantages and drawbacks of each approach discussed, taking into account both practical and pedagogic issues. In this way, the paper aims to offer alternative ways of thinking about the potential of digital games for learning, and present possible solutions to the increasing financial constraints that face the field.

Keywords: budget constraints, alternative approaches, game development, theory

Evaluation of Introducing Programming to Younger School Children Using a Computer Game Making Tool

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Abstract: Computer games are an exceptionally popular medium across all age groups and have significantly impacted on the way that younger people and children spend their leisure time. Educationalists are hopeful that they will be able to utilise the positive attributes of computer games for educational purposes. There have been a number of studies associated with the application of computer games technology (or games-based learning) in tertiary education; however there is still insufficient evidence at this level to properly substantiate the use of computer games technology as a recognised educational approach. There have been even fewer studies gathering empirical evidence about the applicability of games-based learning in Primary Education. This paper will present the findings of an extensive literature review of the use of computer games and education with a specific focus on Primary Education where students have constructed their own computer games. This paper will also report the results of empirical work performed over an eight week period to introduce programming to younger school children using a computer game construction application. The results show that a sense of achievement was evident in most of the children as they participated in making a game.

Keywords: evaluation, primary education, literature review, achievement, children, programming, game construction

Game Based Learning in Entrepreneurship: The Academic Business Planner

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Abstract: Entrepreneurship education is a new field which expands interdisciplinary in higher education. Entrepreneurship lacks an autonomous theoretical framework. Consequently, it is fostered through experiential learning techniques. The majority of entrepreneurial courses are based on collaborative business planning facilitated by business games. Such games simulate the creation of a new business venture supporting the financial calculations, profit inference, sensitivity analysis and risk analysis. The

present case study presents a newly developed online platform which facilitates the collaboration of organic groups in producing the business plan of a new virtual firm. The whole game simulates the learning process that is followed in entrepreneurial courses at the University of Athens for the last years. As an effective tool for blended learning, the platform supports a simultaneous participation of groups and tutors from different departments and universities whereas autonomous collaboration inside groups and collective collaboration/teaching inside courses are possible. Results are open to the participants for inter-comparisons and peer assessment. Online communication amongst users is asynchronous and can be administrated by the tutors. Based on open-ended problem solving, the new educational tool aims to accommodate the future development of curricular entrepreneurial courses, online courses to the public and to also support the encouragement of youth entrepreneurship through the career services of the university.

Keywords: experiential learning, blended learning, online platforms, collaborative learning, new business simulator

METAFORA Learning Approach Processes Contributing to Students' Meaning Generation in Science Learning

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Abstract: Learning science requires high student motivation and understanding of concepts and formal relationships, processes that have been proved to be difficult for students. This paper, trying to study this situation deeper, uses data collected in Greece in the framework of a European Project called METAFORA and aims at exploring how two specific learning activities may contribute to students' science learning. In particular, the issue addressed in this paper concerns the ways in which processes of the METAFORA learning approach such as: a) planning of actions to be taken and b) constructing of a game model, are related to the students' generation of scientific meaning. The principal tool for this study is a half-baked microworld called "Juggler" and the activities developed for it. Half-baked microworlds (Kynigos, 2007), being incomplete by design, challenge students to deconstruct them (so as to find out why things don't work the way they would normally do), change them, build on their parts and create artefacts possibly quite different that the one originally given to them. The "Juggler" half-baked microworld is designed to challenge students to deconstruct and (re)construct the model underpinning the Juggling game, giving them the opportunity to engage in meaning generation processes that include making sense of motion in Newtonian space. Results of this study

indicate that the students following processes of the METAFORA learning approach engaged in meaning making processes that allowed them to gain a deeper understanding of the scientific concepts and the relations between concepts the Juggling game embedded. Collaborating in planning their actions so as to deconstruct and reconstruct the half-baked microworld, the students mostly employed the inquiry-based approach (observe, make a hypotheses, experiment, etc.), which allowed them to address the deconstruction/construction issue in a scientific way.

PhD
Papers

The Optimal Level of Children's Participation in the Design of Games-Based Learning

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Abstract: 'Hart's Ladder' presents eight levels of children's participation as ascending rungs of a ladder, increasing from simple manipulation of children as 'tokens' at the base (level one) towards the freedom of children to initiate and direct a project as 'citizens' at the top (level eight). This paper summarises the methods and results of PhD research into participatory serious games design with children. Investigations have worked with secondary school children (11-16 years) to evaluate the hypothesis that serious games design projects modelled on higher rungs of Hart's Ladder, and hence higher participation of children will produce greater educational artefacts. Educational artefacts are context specific to each project but encompass the product, attendance and accreditation of the process by participants, facilitators and all stakeholders involved. Research has also experimented with design tools including online blogs and the game authoring software 'Game-Maker' to develop an optimal level of children's participation in the design of games-based learning products. The paper documents a serious games design project lead by children with adults in a supportive role (level eight of Hart's Ladder) via an extracurricular secondary school activity using self-selecting participants. Results are compared with a project lead by adults who inform and assign specific roles to children (level four) via a curricular activity using a sample class of school children. Finally, a project lead by adults who share design decisions with children (level six) is documented via a revised extracurricular school activity. Further work is documented working with adult offenders at risk of social exclusion and probation managers from a local probation service to evaluate the scalability of the participatory design approach to learners from a radically different demographic. The paper concludes that the shared design facilitation method at level six of Hart's Ladder produces the greatest educational artefacts from a serious games design project.

Keywords: Hart's Ladder, serious games, participatory design, secondary school children, Game-Maker

Play to Become a Leader and a Citizen of the World: ARGs as Teaching Spaces for Personal and Social Change

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Abstract: The paper presents a research study conducted on an Alternate Reality Game (ARG), "Urgent Evoke" that ran for ten weeks in Spring 2010. The purpose of the study was to explore narrative practices of players engaged in ARG and the effects their participation in the game had on real life behaviour. The focus was on opportunities for increasing ethical sensibilities. Six people participated in the study, two from Serbia two from New Zealand, one from Uganda and one from Rwanda. Five stayed in the game for the whole duration (10 weeks). The method of analysis for this study was virtual ethnography, and it included pre- and post-game surveys and interviews, and the analysis of artifacts created during the game. Qualitative data analysis was employed using *HyperResearch* software. Five data sources were coded: the participants pre-game and exit interviews, blog postings, comments and image and video postings. Some codes were specific to particular data sources, while other codes appear in all data sets. The results show that moral functioning, as analyzed through the Four-component model by Narvaez and Lapsley (2005), depends on the type of interaction between the players and could be directed by game design. They also demonstrated that the focus of moral functioning shifted at different stages of the game, starting from moral judgment with the higher number of instances (at the beginning of the game), going to moral action (during the actual gameplay), and finally to moral sensitivity and motivation (after playing the game). They infer that ARGs could be used for teaching about and achieving social change and personal growth. Using games for education and bringing them into the realm of academic inquiry have many challenges, from turning everything into a game without having a sound pedagogical rationale for the change, to questioning the importance of games as a topic worth studying.

Keywords: ARG, virtual ethnography, moral functioning, narrative

Peer Collaboration, Facilitator Intervention, and Learning Styles in Computer Game-Based Learning: Initial Findings From an Empirical Study

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Abstract: Computer games have received a lot of attention in recent years as tools that provide engaging and effective learning experiences for children. However, relatively less is known about how different components of a computer game-based learning environment might influence the learning outcomes from educational computer games. This paper presents initial findings from an empirical study conducted as part of an ongoing PhD research which aims to explore whether and how factors such as the context of gameplay and individual learner characteristics influence learning. Employing a quasi-experimental design, the paper seeks to address the following research question: What is the relationship, if any, between the learning outcomes from educational computer games and the pedagogical context within which the games are played? How do differences in learning styles contribute to differences in learning gains from educational computer games? Pedagogical context, for the purpose of this paper, comprises two components – facilitator intervention and peer collaboration. Accordingly, four pedagogical contexts are defined: collaborative with active facilitation; collaborative without active facilitation; individualistic with active facilitation; and individualistic without active facilitation. The participants are 231 students from grades seven and eight of five schools in a town in eastern India, assigned to four groups each corresponding to one of the four pedagogical contexts. Two educational computer games – Global Conflicts: Sweatshops and Playing History: The Plague, both based on social science topics are played. Learning outcomes, as measured by scores on post-game assessment tools specific to each of the two games are analysed and findings presented. Initial findings suggest that computer game-based learning is influenced by the learning context within which the actual game-play activity is situated. Specifically, peer collaboration and facilitator support are found to be effective in promoting learning through computer game-play. However, there is a need to further explore the relationship between individual learning styles and game-based learning outcomes.

Keywords: game-based learning, pedagogical context, peer collaboration, facilitator intervention, learning styles, learning outcomes

Dynamic Virtual Learning Landscapes to Enhance Student Reflective Processes

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Abstract: It has previously been shown that the gamification of learning processes within a higher education degree can enhance engagement on a course (Charles, 2010). This approach exposed the "mechanics" or "rules" of a course of learning through game based feedback techniques; so that a student's individual understanding of what is expected for him/her to be a successful learner was improved. Subsequent research proposed greater emphasis on the aesthetic aspects within the game based feedback approach through the use of virtual learning landscapes (VLL) (D. Charles et al 2010). The use of a VLL makes it possible to utilise the physical properties of game environments and virtual worlds to provide students with a rich form of multi-modal information and feedback. In this paper, the concept of the virtual learning landscape is explored in further detail. A background is provided and an adaptive VLL system is presented. The adaptivity within the proposed architecture focuses on tracking the user over time using theory from trace-based systems research (Settouti et al 2009). By using this approach, it is possible to facilitate student self-examination regarding their progress and development. User-tracking enables each student to consider their progress as a learning journey, allowing them to visualise their development within their course of study and illustrating how their interactions have altered the landscape over time. The adaptive core to the VLL in turn functions to dynamically alter the landscape for the user. The multi-modal interactions within the VLL provide improved student reflection mechanisms, helping each student 'learn how to learn' and so to become more effective learners. Results from an initial set of focus tests investigating the use of space, lighting, and environmental effects within virtual worlds for representing student feedback are presented. The data will be used to analyse what aesthetic components will be most effective when implementing the Representation Layer of the proposed architecture.

Merging Digital and Urban Play Spaces: Learning by Playing and Creating Location-Based Games in Secondary Education

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Abstract: With handhelds, it is possible to mix virtual with real-world data (i.e. locations and contexts) connecting virtual worlds to real life. Handheld games can be used to engage students with learning in their (school) environment. In a project called 'Games Atelier' innovative pedagogy was developed that stimulated students to create content with the use of mobile technology. The premise underlying Games Atelier is that the process of creating games improves students' learning experiences. In this paper experiences of 80 students from both pre-vocational and lower secondary education working with 7scenes (a platform to create games) were described. The aim of this investigation was to indicate how 7scenes was used in secondary education, how many lessons were needed to create a meaningful game, how students experienced working with seven scenes and what students and teachers perceived as possible learning outcomes of creating and playing games. Preliminary results showed that in 12-14 lessons a meaningful game can be created. For the students it was hard to place themselves in the position of the player of the game when creating the assignments and they needed more guidance from their teacher especially in formulating the questions in a way that they would be clear to the player. Students mostly learned technically how to design a game. In addition to these technical skills, students learned very few other things such as measuring the temperature of water and the meaning of traffic signs. Several improvements were suggested such as working in two consecutive lessons, use of planning and pre-defined assessment and making the platform more user-friendly.

Keywords: game-based learning, mobile learning, location-based games, secondary education

I Play, Therefore I Create: Constructionist Video Games for Empowered Communities of Learners

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Abstract: In recent times, the development of video games has shown new evolutionary trends, which empower the player with extensive creative tools in an increasingly social scenario. These features have drawn the attention of some scholars towards the potential of commercial video games in education,

especially through the lens of the constructionist theory. *LittleBigPlanet 2*, a console video game for the PlayStation 3, is one of the most promising games in this framework. It can be considered a "2.0" version of a collaborative constructionist environment, due to its powerful tools, which enable the creation and sharing of digital artifacts in a large online community. The use of the game in some educational contexts has inspired the idea of an integrated virtual environment dedicated to *LittleBigPlanet 2* in education: an online space with learners and contributors, who can express their learning needs, discuss their ideas, and share their educational creations. Using *LittleBigPlanet 2*, the participants in the project will form teams to construct educational levels on a specific topic. A contest will be launched to set a topic, to incentive the participation, and to promote a collaborative/competitive approach. The participants will interact in the dedicated forum and will be asked to fill in a "designer's notebook", with their reflections on the construction of educational levels and their involvement in the community. The study aims at investigating the educational potential of a games-based virtual school, through the review of digital artifacts constructed in a collaborative environment and the qualitative analysis of two kinds of data: the online conversations and the "designer's notebooks". The study also aims at nurturing a critical and responsible approach to gaming (reflection) and learning (metacognition) through a constructionist methodology. As a desired outcome, the project aims at inspiring developers and producers of digital media to a new approach to game design, which may unleash the potential of commercial videogames in education.

A Review of Scaffolding Approaches in Game-Based Learning Environments

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Abstract: Game-based learning environments provide learning methods that better correspond with current students' requirements and habits and, as a consequence, engage students in the learning process. In this context, the design of most serious games mainly deals with the problem of, on the one hand, the amount of time required by students interacting within these interactive environments and, on the other hand, showing improvement in achievement related to formal learning outcomes. In that way, scaffolding approaches, which are devoted to providing corresponding instructional aids

to students to facilitate the learning process to accomplish tasks that ordinarily cannot be performed by their own, are of high importance in assisting students' learning and can provide students with appropriate mechanisms to get more benefit from the use of game-based environments. Besides, since serious games in the classroom offer the promise of students' engagement, autonomy, motivation, and modelling potentials, it becomes interesting to scientifically explore and validate the impact of those game-based learning environments that integrate scaffolding in formal learning. Taking this in consideration, this paper presents a review of scientific literature on the application of scaffolding approaches in game-based learning environments. The focus of this work is twofold: 1) present research evidence on the impact of scaffolding approaches in game-based learning; and 2) identify trends and open research questions in the field. To this end, a systematically search online using the keywords 'game-based learning' and 'scaffolding' in a set of relevant scientific databases (i.e., ScienceDirect, IEEE Xplore, SpringerLink, Scopus, Scirus, and Education & Information Technology Digital Library) has been carried out. Studies considered in the review met the criteria of describing game-based environments that have integrated scaffolding mechanisms. The main conclusions of this work draw the role of scaffolding approaches in game-based learning in the digital age.

Keywords: literature review, game-based learning, scaffolding

Leadership in a Networked World: The Case of Massive Multiplayer Online Environments

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Abstract: MMOGs (Massive Multiplayer Online Games) and MMORPGs (Massive Multiplayer Online Role-Playing Games) are considered to be complex, ever increasing systems with a full range of social and material practices, where true mastery of the game can only be achieved by working collaboratively with other players. In situated learning theory, it is argued that learning, thinking and knowing emerge from a world that is socially constructed. Just as in a real world community, when newcomers enter a MMOG, they are gradually introduced to a complex social framework through the tutelage of other community member. They learn to make sense of new areas, especially by engaging with others, discussing, reflecting, and sharing. In order for players to succeed in these games, they have to self-organize and collaborate in order to form guilds; constantly improve to remain competitive, visioning the enemy's and guild's reaction. Nevertheless, these are important leadership skills for the real world as well, revealing multiple

similarities that link the gaming world and the real world. In this sense, it is imperative to understand how these virtual environments can develop or enhance skills that are important for a person's life and work in the 21st century. This realization stresses the need for researching and analyzing the social structures that players create through their interactions with other players. However, despite the significant amount of educational research and the growing interest of the scientific community in MMOGs, there is a lack of empirical research considering cognitive and social aspects of these games. This paper outlines the theoretical rationale behind a doctoral research project currently in progress, which examines the leadership skills that can be developed in a self-organized community in MMOGs. In order to address these issues, this paper presents a theoretical framework for analyzing the social interactions in Multiplayer Serious Games, within the context of community of practice, activity theory, connectivism, self-organization and autopoietic theory.

Work In Progress Papers

Model of Firearms Simulator Based on a Serious Game and Sensor Technology

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Abstract: The purpose of this paper is to describe a new approach for building a firearms simulator that is based on a Serious game – Virtual battle space 2 (VBS2) and motion sensor technology used in The Army of the Republic of Macedonia (ARM). Motion sensor technology is used to create representative weapon movement signals and transfer them to the VBS2 API in order to create realistic weapon movement. This paper's major focus is to give possible solutions for overcoming the problem with the transfer of the signals from the sensors to the computer, so that everything is rightly represented in the virtual 3D engine of VBS2. It also compares this model with the similar models that are in use in NATO allies and it describes challenges and our plans for future work.

Keywords: serious games, VBS2, Simulations, Inertial sensors, education, training

Using Digital Games to Teach the Hero's Journey as a Model for Change and Innovation Management

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Abstract: Joseph Campbell's Monomyth not only provides a well-proven pattern for successful storytelling, it may also help to guide teams and team leaders through the challenges of change and innovation processes. In project "HELD: Innovationsdramaturgie nach dem Heldenprinzip" researchers of the University of the Arts Berlin and the Berlin Gameslab, part of the University of Applied Sciences HTW-Berlin, team up to examine the applicability of the Hero's Journey to change management using an adaptation of Campbell's pattern called „Heldenprinzip®". The project's goal is not to simply teach the stages of the Monomyth as mere facts but rather to enable the participants of training courses and interventions to actually experience its concepts using a portfolio of creative and aesthetic methods. While a pool of aesthetic methods - like drawing, performing, or role-playing - is already being used, the Gameslab subproject qualitatively researches the

potentials for enriching and complementing these methods with interactive digital media and games. This paper discusses two types of treatment and three game-based learning scenarios to be used in training and intervention sessions in general and their pros and cons for our use-case. The first option for treatment is providing the participants with a game that follows the Hero's Journey and inducing them to reflect on the experience and its relation to the learning goal. An alternative strategy is to make participants go through a game sequence or interact with a digitally enhanced setup (e.g. play-acting with motion capturing and real-time rendering of a virtual character) while creating a situation that represents a stage of the journey (e.g. "Refusal of the Call"). Both treatments have their merits and pitfalls, which are discussed in relation to the identified game-based learning scenarios: self-study, blended game-based learning, and face-to-face sessions. Furthermore, these scenarios are compared and specific techniques (e.g. knowledge transfer by storytelling) and boundary conditions, like varying levels in gaming experience between participants, are highlighted.

Keywords: blended game-based learning, physically interactive digital games, Hero's Journey, innovation and change management training

Non Verbal Behavior Analysis in Gaming and Game Based Learning

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Abstract: Current article presents preliminary research work on defining and extracting full body expressivity features within the framework of using natural interaction in games and game based learning. Behavior expressiveness is an integral part of the communication process since it can provide information on the current emotional state, the personality of the interlocutor and his performance when the aim of the interaction is measurable, as is the case for GBL. Many researchers have studied characteristics of human movement and coded them in binary categories such as slow/fast, restricted/wide, weak/strong, small/big, unpleasant/pleasant in order to properly model expressivity. Expressivity dimensions are selected as the most complete approach to body expressivity modeling, since they cover the entire spectrum of expressivity parameters related to emotion and affect. Derived from the field of expressivity synthesis five parameters have been computationally defined following different approaches and comparison of these approaches aims to investigate the most suitable for representing each expressivity feature.

Keywords: natural interaction, body expressivity

Exploring the Benefits of Digital Interactive Games on People's Health

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Abstract: Information and Communication Technologies (ICT) have permeated in all areas of human activity. Digital games are a particular aspect of ICT, constantly evolving, becoming more attractive and as a result attracting the attention of more and more people. The new generation of digital interactive games, tends to affect people's physical activity. The most contemporary digital games that require movement and physical exercise and affect people's physical activity, are called exergames. Exergames combine exercise with the game and are a popular alternative solution of people's involvement with physical activities. Moreover they contribute to increased participation in exercise programs and can have a positive effect on improving and maintaining fitness and health. The instigative lifestyle that people follow, bad nutrition, stress and abstinence from exercise programs, has as a result the appearance of chronic diseases. Interactive games are used to enhance physical activity related to health, for the prevention of asthma, to change dietary habits and to prevent smoking. The purpose of this study was to investigate the impact of digital interactive games on people's physical and mental health. For this purpose an extensive search and record of relevant publications in recent years took place. The results of the study showed that digital interactive games had a positive effect on people's physical and mental health. Involvement with digital interactive games can contribute to weight reduction and fitness, aimed at improving health. Further digital interactive games can contribute to the adoption of positive attitudes towards exercise, resulting to people becoming motivated to participate in sport activities. Also stress and negative mood can be reduced and self-confidence and self-esteem can be improved.

Early Childhood Post-Educated Teachers' Views and Intentions About Using Digital Games in the Classroom

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Abstract: The increasing use of digital games as an entertainment medium provides a great opportunity to adapt games to educational purposes. Especially in pre-school education this adaptation depends directly on the pre-school teachers' attitudes towards Games-Based Learning. Negative attitudes will influence their decision about using digital games in the classroom, while positive views will help them embody the use of digital games in their teaching methods more easily. This paper investigates 50 early childhood post educated teachers' views and intentions about using Digital Games Based Learning in the classroom. Questionnaires were given to the participants at the end of a 10-week introductory level, Information and Communication Technologies course. Results showed that the pre-school teachers had generally very positive views and intentions. The majority of the sample agreed that digital games work as a useful education tool, which can contribute to the learning process of infant pupils. They also express intention to use computer games in their school, so long as their role is not limited. The use of educational digital games may provide models of good learning practices and that by playing games infants will develop practical competencies and social practices. Additionally, from the perspective of the narrative and thematic aspects of computer games, children with special needs such as learning difficulties and specific disabilities will improve their social lives. Intentions were affected by the variables: "years of service", "previous experience in computers", "owning a computer at home", and "self-efficacy in the ability of using computer games". Fewer years of service, greater previous experience in computer usage, the introductory course, owning a computer at home and the self-efficacy in using digital games are related with more positive views and intentions. Further education can assist the pre-school teachers to investigate the potential of the exploitation of the Digital Games in the early childhood education.

Keywords: early childhood post-educated teachers, views and intentions, Digital Games Based Learning, learning processing of infant pupils, self-efficacy in the ability of using computer games

Concept of a Gaming Platform for Domain-Specific User-Created Content

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Abstract: Simulation-based video gaming is a suitable educational tool to deal with the kinds of ill-structured problems which are prevalent in engineering disciplines. There is a lack of such costly video games. This paper introduces the concept for and architecture of an educational online gaming platform. The main idea of this platform is crowdsourcing: Domain experts and players contribute content by providing scenarios. This should lower the costs of development to an acceptable level. We use recently evolved principles of conventional software development to achieve a highly modular and user-extensible gaming platform.

Keywords: game based learning, educational gaming, architecture, framework, crowdsourcing, extensibility, modularity

The Investigation of the Influence of Exergames on the Balance of Deaf Children

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Abstract: The aim of this research is to compare two intervention programs in children with deafness (70 db and above) as regards their effectiveness and the improvement of their balance ability. The participants will be 10 children aged between 15 and 19 years old. They will be divided into two groups of 5 members each (3 boys and 2 girls in each group). The frequency of the sessions is set to two per week, for five weeks and the total time of the training will be 15 minutes for each trainee in the course of one session. The measuring tool to be used will be the Flamingo Balance Test, which aims at contributing to the assessment of the balance ability prior to and after the application of two intervention programs. The alternative from of intervention for the one study group will be the Nintendo Wii Fit Plus in combination with a balance platform. (Wii Balance Board). The alternative form of intervention for the other group will require the participation on a training program integrated in corresponding physical education sessions with specialized and specific balance exercises. Research has shown that children with hearing problems have a lower performance in their balance ability than hearing children of corresponding age groups (Azevedo & Samelli, 2008 ; Siegel, Marchetti και

Tecklin, 1991). Special training programs provide the opportunity to improve balance as well as the individual's proprioception (Di Stefano, Clark & Padua I, 2009). Over the past few years, a growing number of occupational therapists have integrated the electronic games technology into the rehabilitation programs they apply. Rahman (2010) studied the effectiveness of these games regarding the improvement of balance in children with the Down syndrome. The results revealed a statistically greater improvement in balance by comparison to the traditional physiotherapy program. Although numerous comparative studies have been made concerning the improvement of balance, the importance of this present study lies on the fact that there are no studies concerning the participation of deaf children and the use of new methods, such as the digital interactive sports games. Therefore, the results of this original study will contribute to the general knowledge for the assessment of the balance ability and may potentially suggest methods for the improvement of the balance of deaf children.

Model of Social Believable NPCs for Teacher Training

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Abstract: This paper proposes a conceptual model for non-player characters for use in a serious game application. The game is aimed for teacher training with a focus on training of social skills related to conflict handling. Conflict handling is difficult to emulate in a realistic way and appears not frequent enough in the practical training part of teacher education to enable sufficient training. Also, training in a real world situation may be ethically less sound. To develop a serious game for conflict handling training, we need to create non-player characters that can emulate conflicts in a realistic way. For this, we need to extend current models with social and emotional aspects. We present previously developed meta-models that enable us to propose such a model and combine these and recent game research to a Model Social Game Agent.

Learning by Playing

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Abstract: In fall 2011 our learning game "Ludwig" will be released. It is funded by the Austrian Ministry of Science in course of the educational projects "Sparkling Science" and "Departure". "Ludwig" is a 3D-adventure on renewable energies set in a sci-fi context reminiscent of today's blockbuster games. The content of the game is based on the physics curriculum (two physics didacts are involved). The learning progress in our game is mapped by knowledge points, which are received when important quests are solved or if resources are found by the player. The more he or she explores the virtual world the more content is unlocked in the knowledge base. It describes important facts related to energy (combustion, wind energy, solar energy). These facts orient on educational standards for physics. Concerning the design of our knowledge base, important usability criteria (based on national DIN norms) are taken into consideration. Our project involves students and teachers from the very beginning (conceptional stage). Students reflect on the playability of our game, on the usability of our knowledge base (representing the content) and on motivational aspects (learning motivation, interest for physics). Teachers reflect on the potential benefits and problems of using "Ludwig" in class. The methodology is both qualitative and quantitative. While quantitative methods make use of numbers to precisely operationalize values of a particular variable (answers in questionnaires) for further statistical computations, qualitative methods allow for a systematic interpretation of verbal material (interviews, workshops). The empirical phase of our project encompasses elements of a formative (quality assurance workshops) as well as a summative evaluation (assessment of motivational, cognitive and learning processes). By taking this multi-method approach we aim at the development of a standardized method for evaluating future game based learning projects.

Keywords: game based learning, serious games, student centered design, quality assurance, evaluation framework

A Pilot Survey Investigating Trainee Doctors Attitudes to the use of Serious Games in Musculoskeletal Disease Education

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Abstract: Background: Musculoskeletal diseases are major causes of ill health which can lead to significant physical and psychosocial problems. In order to provide more cost effective teaching for doctors e-learning has now become an important component of their education. Attention is now focussing on the educational use of computer games as their inherent characteristics could promote those problem based cognitive skills needed by doctors. Methods: Specialist registrars (SpR) in rheumatology and undergraduate medical students (University of Birmingham and City Hospital, Birmingham UK) studying musculoskeletal diseases were asked to complete an online questionnaire. The survey contained questions about the trainee doctor, how often they played computer games, preferred platforms, genres, their views on video games in medical education as well as which topics in musculoskeletal disease could benefit from being explained in the form of games. Results: Twenty seven trainee doctors responded, 11 undergraduates (M:6;F:5) and 16 SpRs (M:6;F:10). Age range was 18 to 39. Sixteen respondents (59%) played video games of those younger participants (<30) were more likely to play games (n=12: 75%) than the older (>30) (n=4: 25%). Males played more (n=10: 63%) than females (n=6: 37%). Of the eleven undergraduates 82% (n=9) played games where as of the sixteen SpRs only 44% (n=7) played. Platforms used by the sixteen gamers were consoles (n=12: 75%), PCs (n=9: 56%), mobile phones (n=4: 25%) and portable devices (n=3:19%). Preferred genres were in the order adventure (n=9: 56%) > first person shooter (n=8: 50%) and simulations (n=8: 50%) > real time strategy (n=5: 31%) or sports (n=5: 31%) > role playing (n=3:19%) games. Of the total respondents undergraduates were more positive about games in their education. Conclusion: This was a preliminary study and therefore caution must be used when interpreting the data. However there were positive responses from the undergraduates towards the use of video games in their education. In future serious games may play an important role in medical education and warrants further investigation.

Non Academic Papers

Integrating Game Mechanics and Pedagogy: The Design and Production of Prospero, an Exploratory Speech Production Game

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Abstract: Rosetta Stone is a global leader in language-learning software. In 2009, the company launched two products containing suites of games. RWorld is a free portal of online games and activities for advanced language learners. TOTALe is a premium product for beginning learners that includes Rosetta World, a portal of Flash games for practicing what is learned in the course. Between the two worlds, there are currently 22 games with approximately 10,000 content sets in 24 languages, each game and content set targeting a particular aspect of language. This paper will focus on the integration of game mechanics and pedagogy in Prospero, a game aimed at correct speech production in the context of an obfuscated grammar table. First, there will be a brief discussion of Rosetta World to contextualize the thinking behind Prospero as an element of a broader suite. This discussion will be followed by an overview of the game and then a detailed explanation of the pedagogical goals, interaction flow, game elements and content design.

Keywords: game design, pedagogy, speech recognition, grammar, game mechanics

A Letter - A Story: Interactive Games Digital Environment as Part of a Multimedia Learning Package

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Abstract: The interactive web-based games learning environment "A Letter - A Story" is part of an innovative multimedia learning package aimed at teaching the Greek alphabet through entertainment. The package is produced by the Department of Educational Radio-Television of the Greek Ministry of Education, Lifelong Learning and Religious Affairs: www.edutv.gr The interactive games are based on the cartoon educational television series comprising 24 five-minute animated surrealistic stories. Each story corresponds to one of the 24 letters of the Greek alphabet. The multimedia package also includes a printed as well as an e-book interactive game

edition, both of which will be developed in the near future. In designing the interactive games, the contemporary trends in emergent literacy and the development of educational objectives outlined by B. Bloom were taken into account. Although the interactive games are targeted at children 5 to 7 years of age; they can also be used by younger children, and can be effectively used in a school class (smart board), a computer lab, and at home. In that "A Letter - A Story" was designed to stimulate most of the senses, it supports students' active participation and decision-making, gives control to the players, provides opportunities for exploration, reinforces the skills of attention, concentration, seeing, listening, and of course, memory. Through play and active participation, the interactive games aim to reinforce preschool learning skills that lead to progressive written literacy in the first grade, thus meeting educational objectives such as emergent literacy; phonological awareness of the letters; recognition of the written phonetic symbols of the language and their position in words; exposure to the written language; understanding the function of letters in words; listening; and proper production of sounds. This paper presents the pilot application of the interactive web-based games of the first episode of the television series "A Letter - A Story" titled "The Uncombed Cow", which corresponds to the Greek letter A and its sound.

Posters

Do Hard-Players Transfer Soft skills?

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Abstract: In the last two decades digital games have acquired more and more relevance in everyday life, as seen in the latest ISFE report on Videogamers in Europe 2010. Today the effects of the wide diffusion of digital games among laypersons represent a main field of interest in the study of education and learning in a life span perspective. From this insight over the changes in media habits in Europe we decided to tackle the promising and rich panorama regarding the development of soft skills through digital gaming, via a multi-staged project concerning the development and transfer of soft skills in multiple domains: cognitive, relational, emotional and academic performance. With this poster we present the first stage of this project, a preliminary study regarding soft skills development in digital game players. By doing that, we want to focus on individual perception of development and transfer of these skills via digital game experiences. Literature warns us about the inherent transfer difficulties of skills and knowledge from different fields (Salomon et al., 1991; Anderson, 1993). From literature we also know that specific skills can be acquired and developed during digital game experiences, regardless of age, gender, social and economical background (Gee, 2008). A semi-structured questionnaire, specifically designed for this study – on the basis of existing literature – was administered to a sample covering ages from childhood to adulthood. The questionnaire consists of 22 items regarding different fields: game habits, motivation to play, emotional background during play, self perception regarding one's abilities and correlates of digital game play. The results from this questionnaire will be used as field trial in order to identify the main areas that will be assessed over the subsequent phases of the main research. By that time, we will be in the position of selecting those instruments that in literature represent the golden standards for soft skills inquiry. Finally, results and conclusions will be discussed in the light of the general framework, opening future directions for academic debates.

Keywords: digital games, learning, soft skills, education, transfer

Pulling the Strings: Wired Puppetry

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Abstract: We introduce an educational game which aims to inform children about the mechanics, materials and history of puppetry. To create an authentic experience, we developed a custom controller based on a puppet cross used to manipulate real string puppets. Using the input of this controller, we simulate the physical movement of a virtual puppet. Players learn to manipulate a puppet by overcoming obstacles within an action-adventure platform game. In cooperation with schools, we will develop a complete educational package with worksheets for children and guidelines for teachers on how to integrate this into the curriculum. Most games are developed to operate with standardised platform-specific game controllers (Brown et al. 2010). Those game consoles are designed with the capabilities and limitations of the console in mind. This uniformity can be beneficial but it can also be limiting for the game design and for the play experience (Rabin 2005). We try to go beyond these limitations and attempt to create unique play experiences which are not possible with standard game controllers. In order to discuss our solution, we use the model of McNamara and Kirakowski (2006) to describe the links between interaction and technology. This model exists out of three co-dependent factors between humans and technology: functionality, usability and experience. Current software and controller design focuses on functionality aspects, but pays less attention to the usability and experience aspects of a game. We explore these three terms, with a specific emphasis on the experience generated by custom-built game software and the controller that was developed in tandem with it. We conducted a first user test within our target audience in order to evaluate this experience. This test focused upon the action of walking using the latest iteration of the puppet controller. During the test a facilitator was present to explain the use of the controller and provide help in case the children got stuck. Prior to using the controller the children had to indicate their expectations on a Smileyometer, (Read et al., 2002), which is a Likert scale using pictorial representations for children. After the user test the children were asked to rate the actual experience and the complexity of handling the controller on the same scale. The behaviors of the children during the games were also recorded on video, combining a view of the child with a view of the screen. The videos are categorised and analysed using a coding scheme for actions indicating problems. The results of this user test clearly indicates that the use of the custom controller has a positive influence on the game experience. The children enjoyed playing the game, as well as observing other children play.

Children transferred the knowledge they gained about the mechanics of the puppet to players that succeeded them. In some cases, cooperative play with two players manipulating the same puppet, emerged. This illustrates that using the game, most children grasped the concepts and mechanics of puppet manipulation beyond the information we provided them with at the beginning of the test.

Keywords: game, controller, educational, puppetry, user tests

Exploring Intergenerational Interactions Using Social Games; a Case Study

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Abstract: From the last two decades and with an increasing and continuous presence, we have new resources for fun, for facilitate our life, for education, for entertainment and of course for interaction and communication. The ubiquity of the internet has monumentally revolutionized how we interact with each other. From the advent of email, bulletin board systems, to current social networking sites, technology has been integrated with communication to become a prominent focus of the new digital age. People from different ages, different culture, different gender or religious are constantly meeting on the internet under the brilliant disguise of an avatar that belongs to a web browsed game or more specific to a social game. Children of all ages spend a lot of time engrossed in the latest action-packed video console, computer game and recently social games as an extra feature of social network. This new "games" have gained the interest of young people but also have raised a wall between them and their parents or even better their grandparents as it is claimed. The aim of this paper is to present what exactly happens when two generations met in front of a virtual farm as co-players. Who were the experts? Who were the learners? The University Research Institute of Applied Communication and the Laboratory of New Technologies in Communication, Education and the Mass Media of the University of Athens organized the 'Usability and Accessibility Days 2010' and within this event a workshop on intergenerational communication and learning through interactive digital media and social games. During this event young high school pupils were the guides and the teachers for elder people in matters and questions on how to play social games. A hands-on workshop was set and side by side a pupil and a senior sat together to grow their farm. Our goal was to observe the reaction, the behavior, the code of true communication

and interaction of those two generations. All those are the main subject of this paper but more specifically are a part of a new way of long life learning that our times requires to adopt in every aspect of life.

Presentation Only

The Role of Game-Based Learning in Enhancing Children's Emotional Literacy and Metacognitive Awareness

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Abstract: The emerging focus on Emotional Intelligence in the field of contemporary educational practices as well as the imperative need to consider learning how to teach as a continuing and constructive process have been the central point of interest of the present presentation. Upon this premise, the implementation of innovatory game-based learning strategies is considered as a sine qua non for every globalized educational system. The significance of learning through playing games seems to be a part of the natural learning process in human development. Games are an engaging and attractive way to motivate students to learn using entertainment as well as an important way in which learning is made meaningful. Game-based learning (GBL) refers to different kinds of software applications, that use games for learning or educational purposes and it is actually focused on achieving the particular objectives of a given educational content through game play (JISC, 2007). Such games, also termed "serious games" in the literature (de Freitas & Jarvis, 2007; Ritterfeld et al., 2009), are gradually becoming a new form of interactive classroom technique, worthy of exploration for learning purposes. Gee (2003, in Dormann & Biddle, 2006) acknowledges that computer games can be a powerful tool for learning, since they engage players emotionally, cognitively or socially and are broadly accepted as "a significant part of children's everyday life" (Gee, 2003, in de Freitas & Jarvis, 2007). Furthermore, GBL seems to foster children's metacognitive awareness, considering that players need to follow certain metacognitive strategies: they first need to plan an action, then check the initial plan and evaluate their actions during the game and finally change their strategies if needed (Bokyeong et al., 2009). Hence, if used effectively and in a coherent way, GBL can combine the option of experiential learning with the prospective of personalizing the learning experience. As regards the field of Early Childhood Education, for most of the previous century play has been viewed as a well-established curriculum component of childhood education (Gmitrova et al., 2009; Keating et al., 2000). Friedrich Froebel, broadly acknowledged as the father of the modern kindergarten, and other educational theorists such as Dewey, Montessori and Pestalozzi emphasized the particular role of play in the instructional process, since "through their games, children learn about the work and play of the grown-up world" (Henniger, 1991:63). Therefore, playing games and learning have long been deemed as natural elements of children's everyday lives. Furthermore, creativity, considered as "the source of all

learning objects in preschool" (Samuelsson et al., 2008:636), appears to be the missing link between play and learning.

Besides, Vygotsky (1978, in Bokyeong et al., 2009) suggested that learning is a product of activity, culture and context. Along the same line, mediation is the system through which external and social activities are converted into internal and mental cognition. On the threshold of the reflective paradigm's era, this viewpoint is brilliantly echoed in GBL strategies, since the natural setting of a child's game provides opportunities for the development of problem-solving strategies and the construction of critical thinking. With this theoretical framework in mind, a considerable paradigm shift has taken place over the past few decades, in order to include a focus on social and emotional well-being at a universal level within education. Salovey and Mayer (1990), building on Howard Gardner's theory of multiple intelligences, began to develop the concept of Emotional Intelligence. Although "much debate still exists about the definition and parameters of social and emotional intelligence", this model has mostly focused on "learning to be" and "learning to live together", which is often referred to as "social and emotional learning (SEL)" or "emotional literacy" (Hromek & Roffey, 2009:627). Multimodality and interactivity, considered as fundamental properties of serious games (Ritterfeld et al., 2009), make them particularly suitable for delivering SEL. First of all, players balance personal goals with those of others, they try to control their emotional reactions to frustration and they delay satisfaction and fulfillment, in order to play collaboratively. Furthermore, they practice working with certain rules, using self-regulation strategies and self-discipline principles, which ultimately underpin social order.

Over the recent years, educators have seen a different kind of student in their school, the *digital native*. Digital natives are defined by Prensky (2001, in Adcock, 2008:56) as "learners raised in a world of ubiquitous technology, born after the widespread adoption of computers and the Internet", and, thus, easily adaptive to complicated environments. However, the most critical question for young learners still remains the same: How can games be instructional? Engagement and motivation are interesting advantages of GBL but they are not enough for educational purposes. According to Gros (2007:23), "the design of a learning environment, built on the educational properties of games, can be an appropriate way to improve learning", considering that a well-designed game is user-centered and promotes challenges, co-operation as well as the development of problem-solving strategies.

Acknowledging that the face-to-face nature of playing a game can be an excellent springboard for teaching socio-emotional skills and based upon

personal reflections as a pre-school practitioner, I have gradually realized that education more than ever before needs to provide children with an authentic context of learning, which would emerge as outcome of children's participation in the "community of enquiry". In such an educational setting, "each member benefits from the ideas and experience of everyone else and feels valued as part of the whole community" (Coles, 1995:164).

Taking into account that game is above all a form of cooperative and highly inspiring experience-based learning, which actually provides a setting of "social experiment" (Hromek & Roffey, 2009:631), two issues of paramount importance, which are both part of the same continuum, should be highlighted: GBL as an educational strategy to promote self-regulation and self-discipline and GBL as a key factor for children's social, cognitive and metacognitive development. In conclusion, a rather unpleasant remark has to be made: unfortunately and especially as regards Early Childhood Education settings, games have been used primarily as "action-based drill and practices games" (Kiili, 2005:14), where players, based on trial and error, may simply continue experimenting with actions without any reflection on outcomes. It is just from this kind of thinking that the need for new GBL strategies and innovatory interactive games comes into view. Such games could not only enhance preschoolers' true experiential learning, but they could also provide "a fruitful basis" for integration of game play and early childhood pedagogy (Kiili, 2005:17).

Keywords: game-based learning, metacognition, social and emotional learning

Fountains: Table-top Simulation-game on Cultural Integration

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Educational simulations and serious games enable one to gain understanding of the constructs that are difficult to handle using traditional methods of teaching. One of those concepts – the idea of a multicultural society – has been seriously questioned in recent years. Though there are quite a few cross-cultural simulations available, there seems to be demand for some new ones. This presentation introduces the design and pilot evaluation of an intercultural simulation game *Fountains*, which was developed for use in regular classroom settings. The metaphoric simulation is based on the dimensions of acculturation suggested by John Berry (2005): cultural maintenance and contact-participation. Players have to decide how to maintain their characteristics and at the same time improve access to public

resources. Unlike famous cross-cultural simulation games like *Báfa-Báfa* or *Barnga*, (see e.g., Fowler and Pusch 2010) the *Fountains*-game focuses rather on contradictions emerging from acculturation process than on culture-shock or communication barriers.

The *Fountains*-game was developed as a study aid enhancing the comprehension of intercultural integration. Direct target group is age-group 14-22, keeping in mind mainstream classroom setting. Preferable number of players is 6-24; estimated duration, including debriefing, is 90 minutes. During recent years the main attention of researchers has been focused on digital games while traditional table-top simulation games have been somewhat neglected. In order to fill this gap we developed a simulation game that does not require electronic media and contains only simple cardboard-made figures.

The debriefing of the game focuses on the following topics:
- What does acculturation mean? Why and when is it important to maintain cultural identity?
- Prerequisites of cross-cultural communication. How can we improve inter-group cooperation?
- Emotional and rational features of cultural integration: what are we looking for and what are we afraid of?
- Contradiction between identity and acculturation: how to maintain identity without hindering access to public resources?

The game has been tested on groups of students and was introduced to school-teachers. Face validity of the game was assessed by teachers (n=48) and students (n~120) participating in the game. Group interviews were conducted during debriefings, participants' responses were tape-recorded and analyzed. Subjective satisfaction of the participants was of high level in all test-sessions. Feedback on the usability of the game was encouraging and referred to validity of the game as an educational tool.

Short-term learning outcomes were evaluated with a brief questionnaire, containing 5 statements on acculturation. Respondents (n=43) were asked to answer whether they agree or disagree with the given statements, Likert scale from 1-10 was used. The sample was divided into two groups: the test group participated in the game, the control group attended the same lessons but did not take part in the game. The Mann-Whitney U test demonstrated a difference between the two groups.

The *Fountains*-game is not a standalone educational tool. In normal conditions it will be implemented as a part of a wider course or syllabus.

Though finding out some long-term learning outcomes of the game-play would be most interesting, it is difficult to eliminate the role of other potential factors, including huge variability of players and game-facilitators. It should be taken into account that the quality of facilitation and debriefing are mostly *not* under the control of the game designer and/or experimenter. Even if different teachers achieve similar learning outcomes with their students, it is still unclear how the learning takes place. Finding out the conditions that make the players acquire new knowledge or dispel misconceptions during the game could add an extra value to the simulation-gaming method.

The developers of the *Fountains*-game had in mind the definition of culture in traditional sense but the game is quite metaphorical. The presentation will therefore introduce some other potential learning objectives that could be achieved via the game. The participants of the session will learn about a game that is easy to use and does not need much resources to implement. The presentation examines the basic dynamics of the game and describes its elements of design. Some simple mathematics used for creating the rules of the game could be of interest to game designers interested in similar topics.

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