Editorial

Jean-Charles Marty*

LIRIS, UMR5205,
9, avenue Jean Capelle,
F-69622 Villeurbanne, France
E-mail: Jean-Charles.Marty@liris.cnrs.fr
*Corresponding author

Thibault Carron

LIP6, UMR7606,
4, place Jussieu,
F-75252 Paris Cedex 05, France
E-mail: Thibault.Carron@lip6.fr

Biographical notes: Jean-Charles Marty is an Associate Professor at the LIRIS laboratory, Lyon, France. He was responsible for the 'traces and observation' group at the SysCom laboratory (Université de Savoie) for six years. His research interests are in the observation of collaborative activities, through the traces of these activities. The results of his research are applied to technology enhanced learning, and particularly to game-based learning environments. He participates in several projects in this field (Learning Adventure, Learning Games Factory, Serious Lab for Innovation, Pegase, Janus, Jen.lab). He is a member of the editorial board of the *International Journal of Learning Technology* and belongs to many scientific committees linked to learning technology. He has organised and chaired an international school on game-based learning in France in 2011 (gbl2011.univ-savoie.fr). He is a scientific expert for the French Research Agency in the technology enhanced learning and game-based learning fields.

Thibault Carron is an Associate Professor of Computer Science at the University of Savoie. He is a member of the LIP6 laboratory (University Pierre and Marie Curie, Paris 6). He obtained his PhD in Computer Science at the 'Ecole Nationale Supérieure des Mines de Saint-Etienne' in 2001. His current research interests deal with collaborative activity observation and more specifically with learning games. He is actively involved in the design, the development and verification of serious games, the learner modelling and assessment. He is a member of the scientific committee of the European Conference on GBL. He was successfully involved in many serious game projects in several domains (knowledge management, innovation, learning game factory, product lifecycle management, and medical diagnostic). In 2012, he was the Chair of the 4th Annual Young Researchers' Conference in Learning Environments (France) and is currently a Scientific Expert for the French Research Agency.

Among all the new technologies changing ways of delivering education, game-based learning (GBL) seems to be one of the most promising for enhancing learners' motivation. This special issue of *International Journal of Learning Technology* is

dedicated to the exploration of all aspects of GBL environments. One of the key points of GBL is to maintain learners' high motivation. To reach this goal, one can follow different paths, and diverse areas of research are thus linked with GBL. The development of GBL environments with immersive features raises technology issues. New innovative learning scenarios combine quests both in virtual and real worlds, and seldom propose to group the players into teams. Researchers thus need to study new interfaces, especially for mobility purposes and collaborative aspects. One of the most difficult subjects concerns evaluation in GBL environments, in order to check whether and how GBL enhances learning. Social and ethical aspects concerning games and society are also connected to GBL.

This special issue of *IJLT* addresses these central subjects. It consists of six papers selected from 23 initial propositions. The number of excellent contributions received reveals a very dynamic research domain.

Since 2010, gamification of interfaces has been a growing trend in interaction design, creating compelling and fun interfaces that increase user motivation and involvement; in some cases even modifying user behaviour. However, critics point out that gamification is not suited for all applications; and being a new interaction design method, there is probably potential for improvement of the method. In 'Challenging interfaces are more fun! Operant conditioning for the interaction designer', Ingrid Sorgendal and Casper Boks propose a review article. They provide an analysis of gamification in terms of operant conditioning, suggesting that gamification is based on mechanisms described by behaviourists as operant conditioning; and that a better understanding of the latter provides the interaction designer with tools to create better and more accurate gamified interactions, as well as motivating and compelling interfaces without the use of game design elements.

Richard Halverson and V. Elizabeth Owen then present a Framework to test whether click-stream data can provide reliable evidence of learning. The paper, called 'Game-based assessment: an integrated model for capturing evidence of learning in play', defends the idea that assessment designers need to attend to the ways in which game-play itself can provide a powerful new form of assessment. Robust research and assessment vehicles within well-designed games become vital. This requires learning researchers to think of games as both intervention and assessment; and to develop methods for using the internal structures of games as paths for evidence generation to document learning.

The third paper addresses the complex problem of GBL systems design in a vocational training context. In 'Using game mechanisms to foster GBL designers' cooperation and creativity', Jean-Philippe Pernin, Christelle Mariais, Florence Michau, Valérie Emin-Martinez and Nadine Mandran describe a method that present three properties: supporting the elicitation of the game mechanisms so as to boost learner motivation, enabling a team of designers to collectively build a GBL scenario, and improving designers' creativity. The validation of this work is based on an evaluation study performed using a tangible version of the method, based on a board game. The aim of this study was to test whether the method does indeed favour designer collaboration and creativity, but also to gather together the pros and cons of a board game-based design tool versus a computer-based environment.

Bertrand Marne and Jean-Marc Labat state that one of the obstacles of the adoption of serious games (SGs) by teachers is that they cannot shape their educational scenarios to their specific teaching context. Their paper, 'Model and authoring tool to help teachers adapt serious games to their educational contexts', tackles the general problem of

designing tools to help them customise the educational scenarios of SGs. They provide a model suited to describing SGs that are composed of several stages, and to effecting its implementation in an authoring tool in order to help the teachers to visualise, modify and check the consistency of the scenarios. The evaluation of this model shows that it is capable of describing most of the targeted SGs.

As a variation on GBL, Jeremiah I. Holden, Jeff Kupperman, Aviva Dorfman, Tim Saunders, Amanda Pratt and Pagan MacKay propose the concept of 'gameful learning' as a framework that encourages improvisation, playfulness and social interaction, and which takes into account the unique contingencies of individual people and specific content. In 'Gameful learning as a way of being', they describe gameful learning in terms of three elements: attitude, identity, and ignorance. Three cases of gameful learning are examined across diverse learning environments: a fourth grade science class studying matter, a secondary world history class studying the Middle Ages, and an educational technology graduate programme. Cross-case analysis reveals how gameful learning elements relate to attitudes of agency and social necessity, to becoming a game designer, and to embracing ignorance for learning.

The last paper is 'Exploring support mechanisms for learners at-risk through a coupled game environment' by Birgit Schmitz, Roland Klemke and Marcus Specht. They think that dropping out of the school system is one of the prevailing problems that place youths at risk. Therefore, they propose possible support mechanisms for learners at risk by analysing the characteristics of a coupled game. They provide a detailed description of an educational setting that aims to support this target group, and evaluate its individual design elements with regard to the learners' attraction to the game environment, their motivation to deal with learning content, and the knowledge gain. Study results suggest that the *Coupled Games* pattern, as realised by way of SMS interventions, provides ways to support the target group.

In conclusion, we can see through these articles that the intricate nature of GBL environments in the field of games, learning, interfaces, motivation and collaboration appears clearly. The game-based approach represents an extremely rich gathering point and catalyst for several research domains with a converging goal: 'learning enhancement'.

This special issue would not have been published without the help of all the reviewers. We offer them our warmest thanks for their hard work on this special edition of *IJLT*.