# Introduction

## Jaber El Bouhdidi

Team SIGL, ENSA Tetuan,
Tetuan, 93000, Morocco
Email: elbouhdidi.jaber@gmail.com
Email: jaber.f15@gmail.com

## Mohammed Al Achhab and Amel Nejjari

National School of Applied Sciences,
Tetuan, 93000, Morocco
Email: alachhab@gmail.com
Email: amelnejjari@yahoo.fr

**Biographical notes:** Jaber El Bouhdidi is a PhD holder and Professor of Computer Science at the National School of Applied Sciences of Tetuan in Morocco. His research interest includes semantic web, Bayesian networks, neural networks, multi-agents systems, e-learning and big data. He has several papers in international conferences and journals.

Mohammed Al Achhab received his PhD in December 2006 from the University of Franche-Comté, Besançon, France, in the field of formal verification of reactive systems. He was a Temporary Lecturer and Research Assistant, at the University of Franche-Comté from 2005 to 2006. He was an Assistant Professor at the Faculty of Sciences Dhar El Mehraz, Fez from 2007 to 2012. Currently, he is a Professor at the National School of Applied Sciences of Tetuan. His research focuses on analysis and validation of business process, and adaptive e-learning.

Amel Nejjari is a PhD holder and Professor at National School of Applied Sciences-Tetuan, Morocco since 2008. She was Professor at the Faculty of Sciences Tetuan from 2004 to 2008. Currently, she is a member of the research team: SIGL, ENSA of Tetuan. Her research focuses on innovative pedagogies and digital in language learning and teaching.

Updating knowledge continuously, requires new forms of learning. Today, new information technologies and communication have invaded our daily life more than ever necessary in all areas, namely in the field of education. With the development of e-learning, there has been an emergence of new forms of access to knowledge in an attempt to facilitate the learning process, by eliminating the most common problems. Indeed e-learning is an area in full expansion and innovation along with the development of multimedia technologies of the internet.

This special issue has come to focus on educational innovation in the field of e-learning, including the incorporation of new pedagogical approaches to thoroughly

meet the needs of learners. It is considered as a reference for researchers who investigate in learning intelligent systems and pedagogical innovation.

In fact, a large number of submissions have been received from an open call for papers covering all topics of e-learning systems and innovative pedagogies. After a careful and highly competitive review process, four papers have been finally selected.

In the first paper entitled 'Towards adaptive ubiquitous learning systems', El Guabassi et al. propose an approach to provide adaptation and personalisation in ubiquitous settings, while considering a combination of students' learning styles, existing learning standards and learner context. In this paper, the authors have proposed an approach to provide adaptivity in ubiquitous learning based on learning styles of Felder-Silverman, IMS LIP/PAPI learner standards and learner context.

In the second paper entitled 'Clustering learner profiles based on usage data in adaptive e-learning', Kolekar et al. have presented a clustering technique to group learner's profiles based on similar sequences of access to learning material and time spent. A learner model is designed based on the Felder and Silverman learning style model. The clusters have the learners characteristics, which are similar to his behaviour and this, could be used for providing adaptive interfaces and contents.

In the third paper entitled 'Intelligent dynamic case-based reasoning using multi-agents system in adaptive e-service, e-commerce and e-learning systems', En-Naimi and Zouhair have presented a generic intelligent adaptive system based on multi-agents system and case based reasoning. This approach is based on the reuse of previous traces of users which are similar to the current situation in a dynamic way. The system allows collecting and comparing the current situation to the previous traces, which are stored in a database, in order to suggest to the different actors an evolutions of the current situation.

Finally the fourth paper entitled 'Towards a design approach for serious games', Slimani et al. have presented an approach to design a pedagogical serious game. In fact, the authors have proposed a model to provide a specific analysis and a common language to discuss a process of designing a serious game intended for learning. The authors have also presented a multi-layer methodology of serious games design based on the design, play, and experience (DPE) framework. This methodology provides a specific analysis to help game designers and domain experts to define and evaluate their serious games design.

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