

Guest Editorial: Special Issue on Emerging Trends in Education – Part II

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The first eight papers accepted for the Special Issue on “Emerging Trends in Education” were published previously [1]. Here, we introduce the remaining eight papers, which cover quite a varied set of topics, encompassing online education, adaptive learning, student modeling and analytics, as well as gamification.

For example, in “FORGE toolkit: leveraging distributed systems in eLearning platforms” Guillaume Jourjon *et al.* explore technologies supporting online education. The focus is on the creation of a distributed architecture meant to support large-scale laboratory activities by leveraging experimentation facilities deployed in international initiatives for the development of e-learning resources. In particular, the authors present the design of an ecosystem based on configurable widgets that can be exploited in the e-book authoring process to enable the integration of tools designed for producing teaching and educational materials with services offered by experimentation facilities. The authors tested the proposed framework in the context of network and communication courses offered by both academic and industrial institutions worldwide.

In “Tutorials in eLearning: How presentation affects outcomes”, Leana Copeland and Tom Gedeon present a possible application of an emerging human-computer interaction technology like eye tracking in the context of education. More specifically, their goal is to study how different sequences of text and test questions could influence performance in terms of understanding and, ultimately, of learning effectiveness for English language readers. According to the authors, results obtained could be exploited to guide the design of learning materials capable to adapt to users’ behavior.

In “Open student models of core competencies at the curriculum level: Using learning analytics for student reflection” Chih-Yueh Chou *et al.* analyzed the quantity and quality of courses and associated grades to estimate the proficiency level of core competences. Course-competency diagnostic tools, course work performance radar charts and peer-based ranking tables are proposed as a means to enable student reflection by promoting awareness, self-assessment, learning autonomy, planning and positive group interactions.

In “Identifying at-risk students for early interventions: A time-series clustering approach” by Jui-Long Hung *et al.*, the authors apply a clustering approach over disaggregated time series data from the logs of a LMS regarding frequency of course material access, frequency of forum reads, number of discussions posted, number of replies posted, demographic information, and student grades to generate more accurate predictions about at-risk students. Experimental results demonstrate that, compared to alternative methods working on aggregate data, the proposed approach supports earlier detection, which allows online instructors to develop suitable interventions via course design or student-teacher interactions.

In “Similarity-based grouping to support teachers on collaborative activities in exploratory learning environments” by Sergio Gutierrez-Santosa *et al.*, the focus is shifted primarily on teachers. The authors propose a tool that is meant to help teachers to cope with pragmatic and logistic constraints that are typical of collaborative learning scenarios in a physical class context. The tool supports the formation of groups capable of enacting a profitable learning experience where students engage in productive discussions and reflect on their approaches to a given problem by justifying and critiquing proposed solutions. The designed tool has been tested with young students working with a mathematical learning system designed to develop their algebraic ways of thinking by identifying relationships in figural patterns. The tool first compares approaches towards the solution, in order to identify complementary students. Then, it forms pairs of students by using a heuristic aimed to minimize similarity between approaches for the whole class. Experimental tests showed that the proposed approach can reduce the time needed for performing the allocation, by producing groups that are in line with teachers’ own expectation of good pairing.

Related to the topic of group formation, is the relationship between group structure and educational effectiveness. This is explored in “Relation between combination of personal characteristic types and educational effectiveness for controlled project-based learning” by Yusuke Sunaga *et al.*, where a study of the impact of students’ personalities on the knowledge and skills acquired when working on a learning

team is reported. In particular, the authors use a standard scale for classifying students in four categories, i.e., leadership, tugboat, management, and anchor based on their attitudes to be receptive, condensable, preservative, diffusible, and discriminative. Experimental results allowed them to identify personalities capable to enhance group effectiveness.

Given the increasing role that game-based learning is expected to play in the coming years, in the paper titled “Mapping learning and game mechanics for serious games analysis in engineering education” by Michael Callaghan *et al.* the focus is on studying suitable strategies to be adopted in the game design phases to ensure a correct balance between gameplay and learning effectiveness. By considering a concrete case study represented by a course on advanced electronics and electrical circuits theory, the authors studied how to create a serious game with a solid pedagogical grounding aimed to ensure a high degree of engagement through competitive play elements and enabling analytics features to support the collection of measurement about playability and retention.

The last paper, “Design and implementation of location-based learning games: Four case studies”, deals again with game-based learning. In this paper, Javier Melero and Davinia Hernández-Leo address the problem of creating or adapting educational games to teachers’ requirements depending on the particular learning scenario. In particular, they propose a metaphor based on puzzle board elements for developing location-based education games that exploit pervasive mobile technologies to enable contextualized learning in non-formal learning situations.

The richness and diverseness of the papers submitted to this Special Issue confirm the primary role that computing technologies are expected to play in the context of education in the coming years. The hope is that reported experiences will inspire ever more researchers who are actively working in this field and will contribute to further development of the considered domain.

Once again, we thank both the authors and the reviewers for their great contribution. We also wish to thank the Editor-in-Chief, Prof. Fabrizio Lombardi for providing us with the opportunity to guest-edit this Special Issue and for the help he offered throughout the whole publication process.

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