Preface

Humans are largely "collectively driven": One can understand how much human behavior is socially learned and peer influenced. That is, people are collectively rational, not individually rational. This aspect of human behavior reflects in any human endeavor, including education, where students are largely influenced by their peers, teachers, family, and society. Thus, in order to understand and improve education, we need to promote technologies that allows us to better understand the education environment as a social setting. These include techniques of continuous monitoring, human behavior analysis, recommendation systems, adjustment of education activities, intelligent content placement, and others.

In this context, we promoted the Second International Workshop on Social Computing in Digital Education (SOCIALEDU), organized in conjunction with the International Conference on Intelligent Tutoring Systems, on June 6, 2016, in Zagreb, Croatia, and the 7th International Workshop on Collaborative Agents Research & Development — CARE for Digital Education, hosted as a special session together with the COIN workshop, in conjunction with the International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS) on May 9, 2016, in Singapore.

The objective of these workshops was to discuss models of social computing and computational intelligence applied to digital education. This is a growing field of research concerned with bringing interactive technology to teaching and learning in the classroom. We fomented the discussion around new forms of assessment, and models to understand the impact of social behavior, learning context, and individual profile upon learning performance. Some of the leading research questions revolved around:

- How to apply techniques of computational intelligence and social computing for the next-generation digital education scenarios?
- How to construct computational intelligence models to advance the elements of the digital education environment, namely, adaptive content, tutoring systems, intelligent composition systems, learning analytics, and others?
- How to apply computational intelligence and social computing to evolve adaptive learning and adjustable content reactive to social behavior?
- How to build an effective monitoring–recognition–intervention framework in digital education?
- How can we support/guide collaborative teams. How can we offer flexibility in how teams execute plans? How can we make team members follow agreed procedures? Incentives? Or more fundamental, by designing a new market?

This volume includes extended and revised versions of a set of selected works from two different workshops in the area of technology-enhanced learning. The volume is further complemented by a chapter by invited researchers in this field of research. The workshops promoted international discussion forums with submissions and Program Committee members from many countries in Europe (Germany, France, The Netherlands,

Portugal, Romania, Spain, Sweden), Asia and Oceania (Australia, Japan, Korea, New Zealand), Africa (Algeria), and the Americas (Argentina, Brazil, Colombia).

The CARE workshop received seven submissions through the workshop website, from which we selected four for presentation at the workshop. The SOCIALEDU workshop also received seven submissions through the workshop website, from which we selected six for presentation. Nine extended versions of these contributions are published as chapters of the current volume, together with one further chapter by invited researchers. All the submissions were reviewed by at least three different reviewers, and the works selected for this volume are representative of research projects around the aforementioned methods. The selections highlight the innovation and contribution to the state of the art, suggesting solutions to real-world problems and applications built upon the proposed technology.

In the first chapter, "SCALA Web System on the Internet of Things: An Exploratory Research in Social Computing," Lima et al. describe recent developments in the SCALA system, which is a computational system for improving literacy in people with autism. In particular, the paper proposes a roadmap for how to use Internet-of-Things technologies for this purpose and discusses how enhanced sensing capabilities and novel modes of interaction can help to better include students with autism in the teaching–learning process.

The second chapter, "A Link Between Worlds: Towards a Conceptual Framework for Bridging Player and Learner Roles in Gamified Collaborative Learning Contexts" by Borges et al., focuses on the use of gamification techniques for collaborative learning. Their work focuses on relating psychological game player profiles from the game design and gamification literature to roles in collaborative learning contexts. They discuss how to form groups of learners and how to use gamification techniques to support learning in these groups.

The third chapter, "Group Recommendation System for E-Learning Communities: A Multi-Agent Approach", by Irvan and Terano, deals with another aspect of collaborative learning: how to recommend content for a group of learners. They propose a multi-agent system to consider the different preferences of the students, and thus optimise the content recommendation.

In the fourth chapter, "The Impact of Social Similarities and Event Detection on Ranking Retrieved Resources in Collaborative E-learning Systems," Beldjoudi, Seridi, and Benzine propose methods for improving tags, and tag-based retrieval, in folksonomies, in particular for learning object repositories. They propose methods for reducing ambiguity in folksonomies by taking into account the user profile, social interactions, and other contextual information, both when creating the tag, and when searching in a learning object repository.

In the fifth chapter, "Using Semantic Web Technologies to Describe an Educational Domain," Primo, Behr and Vicari present a three-layered ontology for describing learning objects. They propose the use of various semantic web technologies to formalize and reason about learning objects. The aim is to use this approach for automated knowledge discovery in the educational domain.

The sixth chapter, "Forming Tests from Questions with Different Theoretical and Practical Degree" by Popescu and Bold, uses metadata about questions to automatically

create tests in a dynamic model of assessment. They test the viability of their approach in a trial with 20 students, to compare predicted and actual degrees of difficulty.

In the seventh chapter, "Collaborative Assessments in On-Line Classrooms," Osman et al. describe their work on peer assessment for massive online open courses (MOOCs). They propose two complementary methods for leveraging the power of students in an MOOC assessing each other while not losing the specificity and expertise of a teacher performing the assessment. Evaluation in a classroom setting and using simulated data indicate that the methods outperform other commonly used algorithms.

The eighth chapter, "Argumentation Support Tool with Modularization Function and Its Evaluation" by Katsura et al. presents a tool for teaching students discussion skills. Their tool converts the statements that students propose into arguments in a formal argumentation framework and helps the students reason about the logical structure. An evaluation among students indicates that the argumentation tool allows students to better reason about the pros and cons of a statement.

In the ninth chapter, "Gamification Design Framework to Support Multi-Agent Systems Theory Classes," Baldeon et al. describe their experiences in using gamification techniques in a university course. They evaluate the effect of these gamification techniques on learning performance, student satisfaction, and motivation, and found that the gamified experience offered improvements on all three fronts.

Finally, the chapter "The Role of Agent-Based Simulation in Education" by Koster et al. discusses the possibility of using agent-based modelling and simulation to obtain insights into the classroom dynamics between students, teacher, and material. They describe how such a model can be calibrated and validated and its possible uses in better tailoring education for students and teachers in a classroom setting.

We would like to thank all the volunteers who made the workshops possible by helping to organize and peer review the submissions, and to EasyChair for the conference and proceedings management system. We appreciate the help and enormous dedication of the members of the CARE and SOCIALEDU research communities, who continuously participate in our activities as Technical Program Committee, submitting contributions, and helping us put the pieces together to promote this publication.

We are also grateful to Springer for the continuous support and for publishing the printed proceedings after our workshops. This is an invaluable contribution to further promoting the research around computation intelligence and social computing in education, helping to improve the education process and aiming at providing the best education for all.

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