

Preface

Smart education, smart e-learning, smart classrooms, and smart universities are emerging and rapidly growing areas that represent an innovative and intelligent integration of smart objects and systems, smart technologies, smart environments, smart features or smartness levels, smart pedagogy, smart learning and academic analytics, various branches of computer science and computer engineering, state-of-the-art smart educational software and/or hardware systems. This is the main reason that in June of 2013 a group of enthusiastic and visionary scholars from all over the world arrived with the idea to organize a new professional event that would provide an excellent opportunity for faculty, scholars, Ph.D. students, administrators, and practitioners to meet well-known experts and discuss innovative ideas, findings, and outcomes of research projects, and best practices in Smart Education and Smart e-Learning (SEEL).

The KES International professional association initiated SEEL conference as a major international forum for the presentation of innovative ideas, approaches, technologies, systems, findings, and outcomes of research and design and development projects in the emerging areas of smart education, smart e-learning, smart pedagogy, smart analytics, applications of smart technology and smart systems in education and e-learning, smart classrooms, smart universities, and knowledge-based smart society.

The inaugural international KES conference on Smart Technology-based Education and Training (STET) has been held at Chania, Crete, Greece, on June 18–20, 2014. The 2nd international KES conference on Smart Education and Smart e-Learning took place in Sorrento, Italy, on June 17–19, 2015, and the 3rd SEEL conference—in Puerto de la Cruz, Tenerife, Spain, on June 15–17, 2016.

The main topics of the SEEL international conference are grouped into several clusters and include but are not limited to:

- **Smart Education (SmE cluster):** conceptual frameworks for smart education; innovative smart teaching and learning technologies; best practices and case studies on smart education; smart pedagogy and innovative teaching and learning strategies; smart classroom; smart curriculum and courseware design

and development; smart assessment and testing; smart learning and academic analytics; student/learner modeling; smart faculty modeling, faculty development and instructor's skills for smart education; university-wide smart systems for teaching, learning, research, management, safety, security; smart blended, distance, online and open education; partnerships, national and international initiatives and projects on smart education; economics of smart education;

- **Smart e-Learning (SmL cluster):** smart e-learning: concepts, strategies, and approaches; Massive Open Online Courses (MOOC); Small Personal Online Courses (SPOC); assessment and testing in smart e-learning; serious games-based smart e-learning; smart collaborative e-learning; adaptive e-learning; smart e-learning environments; courseware and open education repositories for smart e-learning; smart e-learning pedagogy, teaching and learning; smart e-learner modeling; smart e-learning management, academic analytics, and quality assurance; faculty development and instructor's skills for smart e-learning; research, design and development projects, best practices and case studies on smart e-learning; standards and policies in smart e-learning; social, cultural, and ethical dimensions of smart e-learning; economics of smart e-learning;
- **Smart Technology, Software and Hardware Systems for Smart Education and e-Learning (SmT cluster):** smart technology-enhanced teaching and learning; adaptation, sensing, inferring, self-learning, anticipation, and self-organization of smart learning environments; Internet of Things (IoT), cloud computing, RFID, ambient intelligence, and mobile wireless sensor networks applications in smart classrooms and smart universities; smart phones and smart devices in education; educational applications of smart technology and smart systems; mobility, security, access, and control in smart learning environments; smart gamification; smart multimedia; smart mobility;
- **“From Smart Education to Smart Society” Continuum (SmS cluster):** smart school; applications of smart toys and games in education; smart university; smart campus; economics of smart universities; smart university's management and administration; smart office; smart company; smart house; smart living; smart health care; smart wealth; smart lifelong learning; smart city; national and international initiatives and projects; smart society.

One of the advantages of the SEEL conference is that it is organized in conjunction with several other Smart Digital Futures (SDF) high-quality conferences, including Intelligent Decision Technologies (IDT), Intelligent Interactive Multimedia Systems and Services (IIMSS), Agent and Multi-agent Systems (AMS), and Innovation in Medicine and Healthcare (IMH). This provides SEEL conference participants with unique opportunities to attend also IDT, AMS, IIMSS, and IMH presentations, and meet and collaborate with subject matter experts in those areas—areas that are conceptually close to SEEL areas.

This book contains the contributions presented at the 4th international KES conference on Smart Education and Smart e-Learning, which took place in

Vilamoura, Algarve, Portugal, on June 21–23, 2017. It contains a total of 48 peer-reviewed book chapters that are grouped into several parts: Part 1—Smart Pedagogy, Part 2—Smart e-Learning, Part 3—Systems and Technology for Smart Education, Part 4—Smart Teaching, and Part 5—Smart Education: National Initiatives and Approaches.

We would like to thank many scholars who dedicated a lot of efforts and time to make SEEL international conference a great success, namely Dr. Luis Anido (Spain), Dr. Claudio da Rocha Brito (Brazil), Dr. Janos Botzheim (Japan), Dr. Dumitru Burdescu (Romania), Dr. Nunzio Casalino (Italy), Prof. Melany Ciampi (Brazil), Mr. Marc Fleetham (U.K.), Dr. Mikhail Fominykh (Norway), Dr. Brian Garner (Australia), Dr. Cristina Gasparri (Italy), Dr. Natalya Gerova (Russia), Dr. Jean-Pierre Gerval (France), Dr. Karsten Henke (Germany), Dr. Alexander Ivannikov (Russia), Dr. Aleksandra Klasnja-Milicevic (Serbia), Dr. Marina Lapenok (Russia), Dr. Andrew Nafalski (Australia), Dr. Zorica Nedic (Australia), Dr. Toshio Okamoto (Japan), Dr. Enn Õunapuu (Estonia), Dr. Mrutyunjaya Panda (India), Dr. Elvira Popescu (Romania), Dr. Valeri Pougatchev (Jamaica), Dr. Ekaterina Prasolova-Førland (Norway), Dr. Danguole Rutkauskiene (Lithuania), Prof. Jerzy Rutkowski (Poland), Dr. Demetrios Sampson (Australia), Dr. Adriana Burlea Schiopoiu (Romania), Dr. Ruxandra Stoean (Romania), Dr. Masanori Takagi (Japan), Dr. Wernhuar Tarng (Taiwan), Dr. Yoshimi Teshigawara (Japan), Dr. Gara Miranda Valladares (Spain), Dr. Heinz-Dietrich Wuttke (Germany), and Dr. Larisa Zaiceva (Latvia).

We also are indebted to international collaborating organizations that made SEEL international conference possible, specifically KES International (UK), InterLabs Research Institute, Bradley University (USA), Science and Education Research Council (COPEC), Institut Supérieur de l'Électronique et du Numérique ISEN-Brest (France), Silesian University of Technology (Poland), Multimedia Apps D&R Center, University of Craiova (Romania), and World Council on System Engineering and Information Technology (WCSEIT).

In the near future, we plan to expand the main topics of SEEL conference. Firstly, it can be argued that the primary function of a university is teaching, but other areas of scholarly activity have also always been important. Many modern universities define multiple pillars to characterize their mission, i.e., teaching, research, and engagement with business and the community. Increasingly, students are considering starting their own business instead of getting a job in a company.

Secondly, so far, many researchers still have a vision about a university as a place where a physical location is the hub for learning activity, although some students may be situated remotely. However, in business, the virtual company is becoming increasingly common. Once a company was a building housing the workforce. Now a company may be a collection of people based in geographically dispersed locations, perhaps not even employed, but working together online on some commercial enterprise. In the same way, we should ask if a university needs to be based around a very expensive piece of real estate in the same way it has been in the past. Laboratories need a home, but perhaps the rest can be virtual.

As a result, we plan to add one more important cluster to SEEL main topics—**Smart University: Hub for Students' Engagement into Virtual Business and Entrepreneurship (SmB cluster)**. We plan to introduce it for the 5th SEEL international conference that will be held at Australia's fabulous Gold Coast on June 20–23, 2018.

It is our sincere hope that this book will serve as a useful source of valuable collection of knowledge from various research, design and development projects, useful information about current best practices and case studies, and provide a baseline of further progress and inspiration for research projects and advanced developments in Smart Education and Smart e-Learning areas.

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Prof. Vladimir L. Uskov, Ph.D. (USA)

Prof. Robert J. Howlett, Ph.D. (UK)

Prof. Lakhmi C. Jain, Ph.D. (Australia)

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