Editorial: A Message from the Editorial Team and an Introduction to the January-March 2014 Issue

Peter Brusilovsky and Michael Sharples

WELCOME to the seventh year of publication and the first 2014 issue of the IEEE Transactions on Learning Technologies (TLT). The start of the seventh year is an important mark in the life of TLT, as for some other IEEE Transactions. Since the tenure of Editorial Board members is limited to six years, or more exactly two terms of three years, we are bidding farewell to a whole cohort of our founding board members: Paul De Bra, Vania Dimitrova, Jim Greer, Friedrich Hesse, Judy Kay, Riichiro Mizoguchi, Thomas Ottmann, Demetrios Sampson, Timothy Shih, and Marcus Specht. All of these people are special to us. While being recognized researchers, leaders in their fields, and very busy academics, they contributed a lot of time and effort to engage the community, set up standards, and propel TLT into a group of leading archival journals in the field of learning technologies. The journal would not be where it is today without their help and we thank them for their dedicated service.

At the same time, we are excited to bring in a large group of new board members who will help us to define the face of TLT over the next six years: Gautam Biswas, Simon Buckingham Shum, Ricardo Conejo, Ulrike Cress, Sidney D’Mello, Carlos Delgado Kloos, Michel Desmarais, Eric Klopfer, H. Chad Lane, Tobias Ley, Martin Llamas Nistal, Hiroaki Ogata, Abelardo Pardo, Philip Pavlik, Lung Hsiang Wong, and Diego Zapata-Riveria. We are excited to have so many members to join with us. As you can see from the next section that offers some information about the new board, we are fortunate to engage great researchers in both traditional and emerging areas of learning technologies. With their help, we hope to offer a broader coverage of topics while maintaining thorough professional reviewing. Please join us in welcoming them aboard!

We would encourage the readers to pay attention to the new board member introduction. It is not just a tribute to our excellent new board, but also a statement about the range of fields that we hope to cover and the quality level that we expect. While this introduction takes considerably more pages than usual, it is really important. And with all that, due to the increased page budget of our journal, we still have space for seven new papers that we want to introduce below.

In their paper “Facilitating Teachers’ Reuse of Mobile Assisted Language Learning Resources Using Educational Metadata,” Panagiotis Zervas and Demetrios G. Sampson address an important problem on the crossroads of mobile learning, language learning, and Open Educational Resources (OERs)—the limited reuse of OERs for mobile assisted language learning. To increase the reuse, the authors developed the Mobile2Learn Framework that is presented in the paper. They also apply this framework to demonstrate the importance or OER metadata as a reuse factor.

In “Technology-Supported Orchestration Matters: Outperforming Paper-based Scripting in a Jigsaw Classroom,” Mara Balestrini, Davinia Hernández-Leo, Raul Nieves, and Josep Blat evaluate a wearable technology to manage collaboration in the classroom. The Signal Orchestration System (SOS) is comprised of a band worn on the upper arm, with five colored LED lights and an audible tone that can be programmed to provide coordination information such as allocating students to groups. Two groups, each of 26 high school students, took part in a jigsaw learning activity, one coordinated by SOS and the other by a paper-based method. The results show that students in the SOS group spent significantly less time organizing the activity, gained higher scores in tests, experienced a stronger feeling of group formation awareness, and reported greater enjoyment of the experience.

A study with a similar aim, of supporting collaborative activity in the classroom, is reported by Cheng-Yu Hung, Jerry Chih-Yuan Sun, and Pao-Ta Yu in their paper “An Interactive Game Approach for Improving Students’ Learning Performance in Multi-Touch Game-Based Learning.” They describe an interactive jigsaw puzzle to teach geography, implemented on a multi-touch surface. The puzzle requires learners to place pieces representing city regions on an outline map of Taiwan. A study involving 223 third-grade students at an elementary school in Taiwan explored three levels of task difficulty and three types of scaffolding, including a no-scaffolding control. It found that some scaffolding activities improved the number of problems completed for the more difficult tasks.

In their paper “Augmented Reality Learning Experiences: Survey of Prototype Design and Evaluation,” Marc Ericson C. Santos, Angic Chan, TakaFumi Taketomi, Goshiro Yamamoto, Jun Miyazaki, and Hirokazu Kato review 87 research papers on the use of Augmented Reality (AR) in education, of which 47 include user studies and seven report effect sizes. The studies show a wide variation in effect on student performance, with a mean effect size of 0.56, or moderate effect. The paper describes three inherent benefits of AR for learning: annotating real objects, viewing learning material in context, and integrating sight and touch.

For information on obtaining reprints of this article, please send e-mail to: reprints@iee.org, and reference the Digital Object Identifier below.

Digital Object Identifier no. 10.1109/TLT.2014.2309894
The paper “An Automatic Reference Aid for Improving Productive Language Use” by Mei-Hua Chen, Chung-Chi Huang, Shih-Ting Huang, Jason S. Chang, and Hsien-Chin Liou presents the GRASP reference aid that helps learners of English as a foreign language to master multi-word formulaic expressions, i.e., common phrases that should be learned and used as a whole. Arguing that formulaic expressions form a large share of language use, the authors attempted to go beyond a traditional “list” approach by providing an enhanced access to a large body of formulaic patterns through GRASP. The paper provides an excellent overview of the problem, introduces the technology behind the system, and shares the results of evaluation.

The next paper, written by Javier Torrente, Blanca Borro-Escribano, Manuel Freire, Ángel del Blanco, Eugenio J. Marchiori, Iván Martínez-Ortiz, Pablo Moreno-Ger, and Baltasar Fernández-Manjón, a team from Complutense University of Madrid, discusses “Development of Game-Like Simulations for Procedural Knowledge in Healthcare Education.” Game-like simulations are becoming more and more popular, yet the expansion of this highly engaging learning technology is slowed by the lack of advanced development tools. To address this problem, the authors introduce EGDA, an Educational Game Development Approach that is focused on the acquisition of procedural knowledge. The paper introduces the readers to game-based learning context, presents the approach, and reports the experience of its application in healthcare education. The paper adds to the body of papers on game-based learning previously published in TLT and we hope to provide a broader covered of this field as several experts in this topic are now a part of our Editorial Board.

The paper “Maximum Clique Algorithm and Its Approximation for Uniform Test Form Assembly” contributes to the field of computerized testing. With the rise of large-scale courses, this field becomes increasingly more important and we are glad to add two new board members who are known for their research in this area. In this specific paper, Takatoshi Ishii, Pokpong Songmuang, and Maomi Ueno address the issue of uniform test forms—a set of parallel, but equivalent test forms that are critical to perform reliable assessment that is distributed over time. The authors present their original approach and report results of its evaluation with simulated and actual data.

Enjoy the reading—we hope that you will find these papers interesting and stimulating for your own work!

Peter Brusilovsky, Editor-in-Chief
Michael Sharples, Associate Editor-in-Chief

Gautam Biswas is a professor of computer science, computer engineering, and engineering management in the EECS Department and a senior research scientist in the Institute for Software Integrated Systems (ISIS) at Vanderbilt University. He conducts research in applying artificial intelligence methods to developing simulation-based environments for learning and instruction. The most notable project in this area is the Teachable Agents project, where middle school students learn science by building causal models of natural processes. More recently, he has exploited the synergy between computational thinking ideas and STEM learning to develop systems that help students learn by building simulation models of real-world systems. He has also developed innovative educational data mining techniques for studying students’ learning behaviors and linking them to metacognitive and self-regulation strategies. In all of his projects, there has been a strong emphasis on scaffolding students’ learning of metacognitive strategies, and preparing them for future learning. He also conducts research in hybrid modeling, simulation, diagnosis, prognosis, and fault-adaptive control of cyber physical systems. In conjunction with Honeywell Tech Center, he received the NASA 2011 Aeronautics Research Mission Directorate Technology and Innovation Group Award for Vehicle Level Reasoning Systems and Data Mining methods to improve aircraft diagnostic and prognostic systems. He has more than 400 refereed publications. He is currently an associate editor of the IEEE Transactions on Systems, Man, and Cybernetics, Prognostics and Health Management, Educational Technology and Society, and the Metacognition and Learning journal. He is a fellow of the IEEE, and a member of the ACM, AAAI, AIED, APSCE and the Sigma Xi Research societies.

Simon Buckingham Shum is a professor of learning informatics at the Open University’s Knowledge Media Institute. He brings a human-centered informatics background, with the BSc degree in psychology from York University in 1987, the MSc degree in ergonomics from UCL in 1988, and the PhD degree in design rationale representation from York University in 1991. He researches, teaches, and consults on learning analytics, collective intelligence, and argument visualization, with a current focus on establishing learning analytics as a field. He is a co-founder of the Society for Learning Analytics Research, and convenes research forums with particular interest in analytics for discourse, dispositions, and lifelong learning. He co-founded the Compendium Institute and Learning Emergence network, and was co-founder and editor of the Journal of Interactive Media in Education (1996-2004), one of the pioneering open access, multimedia e-journals. He has published widely, including the books Visualizing Argumentation (Springer, 2003), Knowledge Cartography (2008, Second Edition 2014) and Making Representations Matter (Morgan & Claypool, 2014).
Ricardo Conejo is a full professor in the Department of Computer Science at Malaga University. Currently, his research interests are focused on new assessment techniques, user and learner modeling, and adaptive hypermedia. Currently, he is the director of the IAIA research team. http://iaia.lcc.uma.es/ and http://iaia.lcc.uma.es. He is author of more than 100 scientific publications in conference proceedings and journals. He usually attends and contributes as a member of the program committee of conferences like UMAP, AIED, ITS, and acted as a program co-chair of CAEPIA2003 and UMAP2011. He has participated in more than 25 research projects, with private and public funding, and has conducted many of them.

Ulrike Cress is a full professor at the University of Tuebingen, Germany, and deputy director of the Knowledge Media Research Center. Her research focuses on computer-supported collaborative learning. In particular, she works on the social and cognitive processes of people constructing new knowledge with social media. Much of her research aims to further develop the Co-Evolution Model of Individual Learning and Collaborative Knowledge Building, which she first presented in 2008 in the International Journal of Computer-Supported Collaborative Learning. She has published more than 50 articles in peer-reviewed journals and contributed about 70 chapters to conference proceedings and books. She conducted many projects about web-based learning (financed by EU, DFG, National and federal ministries of Science). She is one of the principle investigators of the European Network of Excellence STELLAR, and member of the DFG Research Group “Analyse und Förderung effektiver Lehr-Lernprozesse” (FOR738). She is also one of the principle investigators of the LEAD-Graduate School (Learning, Educational Achievement, and Life Course Development; Graduate School GSC 1028), that is financed by the German Excellence Initiative. She is member of the program committee of the Virtuelle Hochschule Bayern, editor of the International Journal of Computer-Supported Collaborative Learning, and board member of the Educational Psychologist. Furthermore, she is member of the CSCL-Committee within the International Society of the Learning Sciences.

Sidney D’Mello is an assistant professor in the Department of Psychology and the Department of Computer Science at the University of Notre Dame. His primary research interests are in the cognitive and affective sciences, artificial intelligence, human-computer interaction, and the learning sciences. His more specific interests include affective computing, artificial intelligence in education, speech recognition and natural language understanding, and computational models of human cognition. His research focuses on uncovering the incidence, dynamics, and influence of affective and cognitive states (e.g., confusion, boredom, mind wandering, and frustration) during complex learning and problem solving, applying computational techniques to model these states in context, and integrating the models in learning environments to adaptively respond to the sensed states. His research uses a range of techniques and paradigms ranging from eye tracking, discourse modeling, speech recognition, physiological sensing, facial feature and posture tracking, nonlinear time series analyses, and machine learning. His learning contexts range from advanced learning technologies such as intelligent tutoring systems and educational games to simpler interfaces that support reading, text-diagram integration, and writing.

Carlos Delgado Kloos received the PhD degree in computer science from the Technische Universität München and in telecommunications engineering from the Universidad Politécnica de Madrid, where he is the director of the GAST research group, director of the UNESCO Chair on “Scalable Digital Education for All,” director of an online Master program on e-learning, and vice-rector of infrastructures and environment. He is also the coordinator of the eMadrid Research Network on Educational Technology in the Region of Madrid. His main interests include Internet-based applications and in particular technology-enhanced learning. He has been involved in more than 20 projects with European (Esprit, IST, @LIS, eContentPlus), national (Spanish Ministry, Region of Madrid) and bilateral (Spanish-German, Spanish-French) funding. He has published more than 200 articles in national and international conferences and journals. He has further written a book and co-edited five. He is the Spanish representative at IFIP TC3 on Education and senior member of the IEEE.

Michel Desmarais received the BSc and PhD degrees in psychology from the University of Montreal in 1988 and 1990, respectively, and spent two years during his PhD at Stanford University and Xerox PARC. He is a professor in the Computer and Software Engineering Department at Ecole Polytechnique de Montreal. His field of expertise is in the domains of student and skills modeling, human-computer interactions, and artificial intelligence. He was a principal researcher of the Human-Computer Interaction and Computerized Learning Environments groups at the Computer Research Institute of Montreal between 1990 and 1998, where he directed a research program in HCI and computer assisted learning, and was involved in a number of research projects in close collaboration with private corporations. From 1998 to 2002, he was the director of the Web Services Department in a private company and leader of a number of R&D web-based software projects. He is editor of the Journal of Educational Data Mining and has been involved in the EDM Society activities and conferences since 2008. He is also associate editor for UMUI, chaired the UMAP20012 conference, and served on the program committees of more than 30 conferences in the last 10 years.
Eric Klopfer is a professor and director of the Scheller Teacher Education Program and The Education Arcade at MIT. His research focuses on the development and use of computer games and simulations for building understanding of science, technology, engineering, and mathematics. The games that he works on are designed to build understanding of scientific practices and concepts as well as critical knowledge, using both mobile and web-delivered game platforms. In the realm of simulations, his work focuses on students understanding complex systems through, and connecting computer programming with scientific practice, critical thinking, and real-world issues. He is the co-author of the books, Adventures in Modeling, The More We Know, as well as author of Augmented Learning. He is also the co-founder and president of the non-profit Learning Games Network (www.learninggamesnetwork.org).

H. Chad Lane received the PhD degree in computer science from the University of Pittsburgh in 2004. His research involves applications of artificial intelligence to educational problems. He joined the USC Institute for Creative Technologies in 2004 where his work has focused on issues related to learning in game-based and informal training environments. Much of this work involves using pedagogical agents to enhance learning, such as via role-play and intelligent feedback. Recently, he was a co-PI on the Responsive Virtual Human Museum Guides project where he directed the development of Coach Mike, a pedagogical agent that teaches programming at the Boston Museum of Science. Because of the interdisciplinary nature of his research, he has ongoing collaborations with cognitive and educational psychologists from the Army Research Institute (ARI), the USC Rossier School of Education, and the USC Keck School of Medicine. In addition, he has worked closely with US Army instructors and subject-matter experts to both understand their pedagogical approaches, as well as to integrate computer-based training support into Army programs of instruction. The current focus of Dr. Lane and the ICT intelligent tutoring team is on the development of authoring tools for virtual-human based training. The approach, called situated pedagogical authoring, allows a nontechnical user to populate models of expert performance and feedback by interacting with a system as the learner will see it, thereby reducing the need to learn new interfaces and methods for communicating with the tool. He has more than 40 publications in AI and the learning sciences. He currently sits on the executive committee for the AIED Society and recently served as program cochair for the AIED 2013 conference in Memphis, Tennessee. In addition, he is an associate editor for several leading educational technology journals, serves as a reviewer and expert for the European Commission, and is on the advisory board for the new NSF Cyberlearning CIRCL center.

Tobias Ley received the PhD degree in psychology and knowledge management from the University of Graz. He is a professor of digital ecosystems in the Center for Educational Technology (CET) at Tallinn University. His research interest are in technology-enhanced learning and knowledge management, where he applies models of human cognition to human computer and human information interaction, to social, adaptive and semantic systems, and in the context of collaborative knowledge building. Before joining CET, he was a postdoc in the Cognitive Science Section at the University of Graz and a deputy division manager at the Know-Center (Austria’s Competence Center for Knowledge Management). He has had leading roles in a number of large-scale EU funded projects in the area of Technology-enhanced Workplace Learning (FP7 Learning Layers, FP7 MATURE, FP6 APOSDLE), as well as about 20 projects funded from the Austrian Competence Center Program for Excellent Technologies in the areas of knowledge and competency management. He has earned an outstanding paper award (Journal of Knowledge Management) and a best interdisciplinary paper award (European Conference on Technology-enhanced Learning, EC-TEL), and has served as a program chair (2013) and general chair (2014) for EC-TEL.

Martin Llamas-Nistal (M’92-SM’06) received the telecommunication engineering degree and PhD degree in telecommunication from the Madrid Polytechnic University (UPM), Madrid, Spain, in 1986 and 1994, respectively. He is currently an associate professor in the Department of Telematics Engineering, University of Vigo, Spain. From 1994 to 1997, he was vice-dean of the Higher Technical School of Telecommunication Engineers, University of Vigo. From 1999 to 2003, he was the head of the ICT Area at the University of Vigo. He is author or coauthor of more than 200 papers in international refereed journals and conference proceedings. His research areas are web engineering and e-learning, where he has participated as researcher and director in different research national and international projects in these fields since 1995. He is a member of the Association for Computing Machinery (ACM) and IFIP WG3.6 (distance education). He is a member of the Board of the IEEE Spanish Section and member of the IEEE-ES AdCom, serving on the Publications Committee. He is Founder and Editor-in-Chief of the IEEE Journal of Latin-American Learning Technologies. He was chairman of the Spanish Chapter of the IEEE Education Society from 2008 to 2010. He has received several awards from the W3C and IEEE.

Hiroaki Ogata is a professor at Kyushu University, Fukuoka, Japan. He was a visiting researcher in the Center of Lifelong Learning and Design, the University of Colorado at Boulder, from 2001 to 2003, and also an adjunct researcher at the Japan Science and Technology Agency (JST) from 2009 to 2013. He has published more than 270 refereed journal and conference papers in the area of mobile and ubiquitous learning, CSCL and CALL. He received several best paper awards from JSISE in 1998, WebNet 1999, ICALT 2006, ICCE 2008, CollabTech 2008, mLearn 2009, and ICCE 2010. He is currently an associate editor of Research and Practice in Technology Enhanced Learning, International Journal of Mobile Learning and Organisation, and joins the editorial board of the International Journal of Computer-Supported Collaborative Learning, SLE, and IPSJ. He was an EC member of IAmLearn, and serves an EC member of SOLAR and APSCE.
Abelardo Pardo received the PhD degree in computer science from the University of Colorado at Boulder in formal verification of digital circuits. He is a lecturer in the School of Electrical and Information Engineering, The University of Sydney. He is co-director of the Software Engineering group. His research interests include the application of technology to explore, understand, and influence human behavior. He has experience in the use of digital devices in areas such as behavioral analytics, social networks, computer supported collaboration, personalization, and technology enhanced learning. He has participated in national and international projects funded by the Office for Teaching and Learning (Australia), US National Science Foundation, and the European Union. He is the author of more than 100 research publications in prestigious conferences and journals, member of the steering committee of the Society for Learning Analytics Research (www.solarresearch.org), associate editor of the Journal for Learning Analytics, and member of the editorial board of the Journal of Social Media and Interactive Learning Environments.

Philip I. Pavlik Jr. received the PhD degree in cognitive psychology from Carnegie Mellon University in 2005, where he studied the ACT-R computational cognitive modeling system. From there, he pioneered work on using cognitive models to schedule adaptive practice for facts by optimizing the distribution of practice (spacing) effect. Following this PhD work, he worked at the Pittsburgh Science of Learning Center as a postdoctoral research associate and systems scientist where he worked on creating the FaCT (Fact and Concept Training) system tool for educational practice scheduling research and pioneered new approaches to knowledge transfer as principle investigator of an Institute of Educational Science grant. In his current position as an assistant professor at the University of Memphis in the Institute for Intelligent Systems (with a joint appointment in Psychology), he studies adaptive practice, complex knowledge representation, memory processes and computational modeling of cognition, especially transfer processes. He serves as an ad hoc editor for a variety of journals and is and has been a member of various professional organizations such as the Cognitive Science Society, Psychonomic Society, International Artificial Intelligence in Education (AIED) Society, and International Educational Data Mining (EDM) Society. He was a program committee cochair for EDM 2010, local organizing cochair for EDM 2013 and local organizing cochair and proceedings editor for AIED 2013.

Lung-Hsiang Wong received the PhD degree in artificial intelligence in education from the Nanyang Technological University, Singapore, in 1998. He started his applied R&D career at the Information Technology Institute, National Computer Board (now InfoComm Development Authority), Singapore, and later at the Kent Ridge Digital Labs (now Institute for InfoComm Research), National University of Singapore, with a focus on designing intelligent agents for teaching and learning. He then worked as a consultant/lecturer in knowledge engineering in the Institute of Systems Science, National University of Singapore, where he spearheaded the development of the e-mentoring framework and provided relevant training for Virtual Institute, the e-learning portal of the institute. He moved into the research field of learning sciences and technologies when he joined the National Institute of Education (NIE), Nanyang Technological University in 2005. He is currently a senior research scientist in the Learning Sciences Lab (NIE), with research interests in mobile and seamless learning, computer-assisted language learning, computer-supported collaborative learning and in-service teachers' professional development. He is an executive committee member of the Asia-Pacific Society for Computers in Education (APSCe) and was/is chairing the mobile learning-related Special Interest Groups of the APSCE and the Global Chinese Society for Computers in Education, respectively. He was the program chair of the International Conference on Computers in Education 2013. He serves on the editorial boards of several international journals and is the lead editor of Seamless Learning in the Age of Mobile Connectivity, one of the first scholarly books on mobile-assisted seamless learning, slated to be published later in 2014. He has published more than 150 academic papers and received eight Best/Outstanding Paper Awards at various international conferences.

Diego Zapata-Rivera received the PhD degree in computer science from the University of Saskatchewan in 2003. He is a senior research scientist in the Cognitive and Learning Sciences Center at Educational Testing Service in Princeton, New Jersey. His research at ETS has focused on the areas of innovations in score reporting and technology-enhanced assessment (TEA) including work on adaptive learning environments and game-based assessments. His research interests also include Bayesian student modeling, open student models, conversation-based tasks, virtual communities, authoring tools, and program evaluation. He has produced more than 100 publications including journal articles, book chapters, and technical papers. He has served as a reviewer for several international conferences and journals. He has been a committee member and organizer of international conferences and workshops in his research areas. He is a member of the Board of Special Reviewers of the User Modeling and User-Adapted Interaction journal. Most recently, he was invited to contribute his expertise to projects sponsored by the National Research Council, the US National Science Foundation, and NASA.