A Message from the Editorial Team and an Introduction to the July-September 2017 Issue

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WELCOME to the July-September issue of 2017. This is the time of year when we review journal performance and report key parameters. Most important, we are happy to report that according to the 2016 Journal Citation Report, *IEEE TLT* has reached an impact factor of 2.267, a considerable increase from the 2015 impact factor of 1.129. The other key parameters have changed very little. For papers submitted in 2016, *TLT*'s average time to first decision was 61 days, compared with 59 days for papers submitted in 2015. The acceptance rate was 14.6 percent for papers submitted in 2016 and 13.1 percent for papers submitted in 2015. We hope we can maintain this trend: to keep *TLT* as a high-impact journal while avoiding delays in processing submissions. In this context, we want to share another important item of news: the annual page budget of the journal has been increased by 100 pages. This will help us considerably to decrease the main waiting point from the time when a paper is pre-published online to when it is assigned to a specific issue (and thus 'formally' published). This issue is the first with the increased page budget and is the largest we have published so far, with 11 papers.

We start the issue with a review paper "Adaptive 3D Virtual Learning Environments—A Review of the Literature." Reviews are important for the readers of this journal and we are pleased to feature an extensive survey of an emerging area. Ezequiel Scott, Alvaro Soria, and Marcelo Campo have analyzed a considerable number of recent publications in this field and have classified the work along dimensions such as 'applied instructional strategies', 'type of content', 'adaptation techniques', and 'types of reported assessment'.

A welcome trend is an increase in papers that apply findings from human cognition and the learning sciences to design technologies for developing student skills and competences. Three papers in this issue address ways to develop student competences in STEM education, all of which have relevance to other disciplines.

The paper by Kurt VanLehn, Lishan Zhang, Winslow Burleson, Sylvie Girard, and Yoalli Hidago-Pontet asks "Can a Non-Cognitive Learning Companion Increase the Effectiveness of a Meta-Cognitive Learning Strategy?". The authors describe a combined tutor and meta-tutor. The tutor taught high school students how to construct models of dynamic systems, such as the spread of an epidemic, and the meta-tutor taught them general strategies for learning. Added to these was a computer-based learning companion that used non-cognitive techniques–affect, motivation, self-belief modification, and politeness–to persuade the students to persist in adopting the good learning strategies. A study with 37 high school students showed that students with the learning companion performed better than those without during the training phase, though that advantage was not continued into a transfer phase.

In her paper "A Framework for Educational Technologies that Support Representational Competencies," Martina Angela Rau describes a step-by-step approach to design educational technologies that teach competences in interpreting multiple representations. This SUREC method is embedded in the Chem Tutor tutoring system for atomic structure in chemistry. A controlled experiment with 117 undergraduate students showed a marginally significant advantage for support in conceptual and perceptual sense-making over a control condition of textbook exercises. A further field study with 62 undergraduates showed significant learning gains from using a version of Chem Tutor enhanced with problems to build conceptual and perceptual fluency.

The focus of "A Novel Group Engagement Score for Virtual Learning Environments" by Jorge Castellanos, Pablo A. Haya, and Jaime Urquiza-Fuentes is active social learning, whereby students work in groups to create videos that explain complex topics and then discuss the videos online. The authors propose a group engagement score, combining both individual activity and similarity of participation, as a way for educators to identify disengaged students or inactive groups. In a trial on the topic of Object Oriented Programming (OOP), 40 university students organized themselves into 17 groups. Over 18 days, they made and assessed videos to explain aspects of OOP. Analysis showed that a large part of the discussion took place off the platform, e.g., on WhatsApp. Further work is needed to track interactions outside the platform and provide teachers with a flexible toolkit to design, track, and intervene in group activity.

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Two papers in the issue contribute to research on remote and virtual labs, related learning technologies that are frequently featured in our journal. In fact, the first of these papers "Towards New Multiplatform Hybrid Online Laboratory Models," submitted by Luis Rodriguez-Gil, Javier García-Zubia, Pablo Orduña, and Diego Lopez-de-Ipiña, attempts to bridge the gap between these two types of lab by offering hybrid labs in which virtual and real components interact with each other. The authors propose an architecture for hybrid labs that uses HTML5 and OpenGL standards. The architecture was evaluated in a case study using a Watertank laboratory.

The second paper in this group, "A Novel Wiki-Based Remote Laboratory Platform for Engineering Education" by Ning Wang, Xuemin Chen, Qianlong Lan, Gangbing Song, Hamid R. Parsaei, and Siu-Chun Ho introduces another hybrid laboratory platform, a combination of a remote lab and a Wiki. This combination can make remote labs more self-contained. While the remote lab component allows experiments to be performed, the Wiki component supports planning, discussion, collaboration, and reporting. The proposed hybrid architecture has been created using a unified framework for remote laboratory development and an open source MediaWiki package. The paper describes the architecture and its implementation in detail and demonstrates its application in two remote experiment cases.

The remaining papers cover a variety of technologies to support students, instructors, and content developers.

Multi User Learning Environments (MULEs) have evolved from spaces on commercial platforms like Second Life to open environments such as OpenSim that offer more opportunities for programming educational content and interaction. In "A Case Study in User Support for Managing OpenSim Based Multi User Learning Environments," Indika Perera, Alan Miller, and Colin Allison describe a tool for educators to configure and manage MULEs. Based on a visual graph of OpenSim functions and their relations, it assists educators to create a context for teaching and to switch off elements that distract from learning, such as inappropriate flying or vandalizing the work of other students. A comparison study with 70 academic tutors found better performance in configuring complex teaching environments and higher perceived educational value for the version that included the management tools compared to one with introductory material only.

The paper "Impact of Using a Robot Patient for Nursing Skill Training in Patient Transfer" by Zhifeng Huang, Chingszu Lin, Masako Kanai-Pak, Jukai Maeda, Yasuko Kitajima, Mitsuhiro Nakamura, Noriaki Kuwahara, Taiki Ogata, and Jun Ota addresses a practical issue in training nurses, of how to improve their skills in transferring patients from, for example, a bed to a wheelchair. Current methods require nurses to learn correct procedures by handling mannequins or human volunteers who simulate patients. Both methods have limitations: mannequins cannot simulate the actions on patients' limbs, and human volunteers cannot adequately mimic patients suffering from muscle weakness. The novel approach described in the paper is to develop a robot patient with movable limbs controlled by servo motors and electromagnetic brakes. A first study showed that nursing teachers assessed the robot patient as suitable for training nurses. A second study with 20 nursing students compared training with the robot to training with a human volunteer. It found that both groups improved their performance, but in different aspects of the task. The robot could simulate active hugging, passive standing up and sitting down, and unstable standing.

The paper "IP Addressing: Problem-Based Learning Approach on Computer Networks" by Aleksandar Jevremovic, Goran Shimic, Mladen Veinovic, and Nenad Ristic presents an infrastructure for supporting personalized problem-based learning and its application for implementing a learning tool to practice IP-addressing skills. Progressively more complex versions of the learning tools were evaluated in a multi-year study performed in the context a networking course. The paper presents the results of this evaluation and summarizes lessons learned.

In "Needles in the Haystack: Finding Content Worth Preparing for Workplace Learning with the KEP Model," Stefan Thalmann and Ronald Maier address the problems of knowledge transfer in organizations. Preparing knowledge elements to facilitate knowledge transfer is a recognized challenge in the context of workplace learning. To support this process, the authors have developed a Knowledge Element Preparation model and assessed the value of this model in a case study.

The paper "Teaching with a Dual-Channel Classroom Feedback System in the Digital Classroom Environment" by Yuan-Chih Yu is focused on supporting instructors in their teaching using a novel classroom feedback system that goes far beyond functionalities provided by currently popular 'clicker' systems. To provide classroom feedback to the instructor, the system collects both students' verbal instructional responses and their 'social signals' expressed by head movements. This 'dual channel' feedback is integrated and presented to the teacher using an instructor's dashboard. The performance evaluation demonstrated that despite challenges in recognizing head movements, the systems offer a sufficient level of accuracy in providing "social" feedback. In addition, the use of verbal feedback was found beneficial for questions that required longer answers. The satisfaction survey also revealed benefits of the new feedback system while also indicating directions for future research.

Enjoy your reading!

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