

# Special Issue Introduction: A Critical View of Technology-Enhanced Learning and Instruction In the Digital Age

**Kinshuk**, Athabasca University, Canada

**Demetrios G. Sampson**, University of Piraeus, Greece

**Pedro Isaías**, Universidade Aberta, Portugal

**J. Michael Spector**, Florida State University, USA

**Lynne Schrum**, George Mason University, USA

This special issue is a result of the third International Association for the Development of the Information Society (IADIS) International Conference on Cognition and Exploratory Learning in Digital Age (CELDA), which was held in December 2006 in Barcelona, Spain, and was endorsed by the Japanese Society of Information and Systems in Education. This series of conferences was established in recognition of advances in cognitive psychology and computing that are having significant impact on learning and instruction.

The IADIS CELDA 2006 conference addressed issues concerned with evolving learning paradigms and instructional processes (see <http://www.iadis.org/celda2006/>). Nineteen topic areas, ranging from the acquisition of expertise to virtual universities, were addressed by full papers presentations, short paper presentations, and reflection papers. We received 153 submissions from more than 30 countries, which resulted in 34 full papers, 32 short papers and 14 reflection papers. Consistent with past practice, the CELDA organizing committee selected the best papers to be published in a relevant international journal, which in this case is the *Journal of Research on Technology in Education (JRTE)*. The *JRTE* editor participated in the selection and editing of best papers along with the members of the organizing committee. In addition to two keynote presentations by Professors Gros and Merrill and two outstanding paper awardees (Darabi and Stoyanov), the committee selected six additional papers to complete this special issue. Due to space limitations, two of the papers will appear in the next edition of *JRTE*. The following is a brief overview of the papers that comprise this special issue.

Merrill's paper on task-centered instruction provides an elaboration of component analysis and instructional strategy consistent with a task-centered approach and the notion of reusable knowledge objects. Gros' paper on the design of game-based learning environments reviews what has been learned from children's experiences with educational electronic games and consolidates these lessons learned in to a framework for designing highly interactive educational games for school-age children. The paper by Darabi, Nelson and Paas presents an application of a measure of cognitive load and perceived mental effort to as-

less learner involvement in different instructional conditions involving conventional problem solving, product-oriented worked examples and process-oriented worked examples; the two worked example strategies were correlated with higher learner involvement and performance. The paper by Stoyanov and Kirschner also explored problem solving strategies and their possible interaction with the cognitive styles of learners; the findings suggested no significant interaction effect, but were nonetheless useful in developing specific instructional design guidelines for technology-enhanced learning environments for ill-structured problem-solving domains. The paper by Schär and Zimmerman also explored the implications of cognitive load for instructional design in the context of learning environments involving animations; no effect of learner control of the animation on learning effectiveness were noted; specific implications for the design of effective instructional animations were developed based on the findings.

The paper by Graf, Violo, Kinshuk, and Leo presents an in-depth analysis of learning style with implications for the design of instruction; the focus in this paper is on the Felder-Silverman learning style model and how it can be incorporated into the design of technology-enhanced learning environments. The paper by Dennen addresses the persistent problem of presence in online learning environments; this paper analyzed three different forms of instructor presence in online courses and how they affected learner engagement; in general, she argues that instructor presence and positioning is a new instructor competency for those teaching online. Martunnen and Laurinen provide an analysis of collaborative learning in secondary school settings; the focus of the analysis is on chat discussion and the development of argument diagrams; collaboration was found to have a generally positive impact on the quality of student diagrams and also on student ability to recall and create arguments.

The next two papers will appear in the next edition of *JRTE* due to space limitations. Guðjónsdóttir, Cacciattolo, Dakich, Dalmau, Davies, and Kelly explore inquiry based learning in four countries; the aim of the three-year study was to find ways to promote inclusive community responsive pedagogies; findings suggest that socio-cultural factors, structural factors, and values have a strong impact on the nature of the educational system. Lainema and Lainema examine critical elements in developing business expertise in the digital age; the analysis made extensive use of simulations to explore team learning processes and their role in developing business acumen.

Collectively, these 10 papers represent a critical view of technology-enhanced learning and instruction in the digital age. The coverage is both broad—covering primary, secondary, post-secondary and business contexts and a variety of learning goals and situations—and focused—covering very specific issues pertaining to problem solving strategies and assessment measures for ill-structured problem domains.

We would like to thank the following reviewers, who provided detailed comments to the authors and contributed significantly to the quality of this special issue: Tristan Johnson (Florida State University), ChanMin Kim (Florida State University), and Piet Kommers (University of Twente).