

Challenges of implementing data analytics in productive education systems for supporting cognition and exploratory learning in 21st century

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Introduction

The current state of implementation of data analytics in education institutions may be a paradoxical exercise. World-class experts in data science, information systems, management and education may be part of the institution. However, these experts may only have loose insights into the requirements of data analytics or digital learning when it comes to questions of implementation. Still, the link between available data, analytics and digital systems are globally investigated for their potential to transform learning, teaching and assessment towards offering unique learning experiences to the twenty-first century learners. Questions focussing on the implementation of data analytics and digital learning in productive educational systems have been addressed at the Cognition and Exploratory Learning in the Digital Age (CELDA; www.celda-conf.org) conference series for more than 10 years.

CELDA is a unique international research conference that brings together educational technology and educational psychology researchers, as well as instructional designers and other educational practitioners for the purpose of fostering and promoting ongoing dialogue between these academic and professional communities. CELDA is sponsored by the International Association for the Development of the Internet Society (www.iadisportal.org/).

CELDA has created, since it was initiated in 2004, a community that has contributed to outcomes in the form of special issues published in academic journals (Ifenthaler *et al.*, 2012b, 2009, 2015, 2018, 2012a, 2014; Kinshuk *et al.*, 2010; Kinshuk and Sampson, 2006; Kinshuk *et al.*, 2007, 2008; Sampson *et al.*, 2014; Spector *et al.*, 2016a, 2009) and edited books that inform and influence academic and professional practice (Ifenthaler *et al.*, 2011; Isaias *et al.*, 2012, 2015; Sampson *et al.*, 2014, 2018, 2013; Spector *et al.*, 2010, 2016b).

This special issue based on papers presented in CELDA 2017 is the most recent outcome of this well-established process. It is created from the extended versions of the best papers around a core theme from the 2017 International Conference on CELDA (www.iadisportal.org/celda-2015-proceedings) that was held in Vilamoura, Algarve, Portugal, in October 2017. Each contribution reports an original research work in the theme of this special issue – “Challenges of implementing data analytics in productive education systems for supporting cognition and exploratory learning in 21st century”.

Contributors to this special issue

The special issue starts with a paper by Dirk Tempelaar (Maastricht University), Bart Rienties (Open University) and Quan Nguyen (Open University) that demonstrates how the combination of trace data derived from technology-enhanced learning environments and self-response survey data can contribute to the investigation of self-regulated learning processes. Findings of “A multi-modal study into students’ timing and learning regulation: time is ticking” show that in a blended setup, one needs to distinguish the grand effect on learning from the partial effect on learning in the digital mode: the most adaptive students might be less dependent for their learning on the use of the digital learning mode.



“Real-time learning analytics system for improvement of on-site lectures” by Atsushi Shimata (Kyushu University), Shin’ichi Konomi (Kyushu University) and Hiroaki Ogata (Kyoto University) proposes a real-time lecture supporting system. The setting are on-site classrooms where teachers give lectures and students learn through teachers’ explanations or while working on exercises. Findings indicate that teachers are able to adjust the speed of their lecture based on the real-time feedback system, which also resulted in encouraging students to interact using bookmarks and highlights on keywords and sentences.

Matthias Kuhnel (University of Mannheim), Luisa Seiler (Baden-Wuerttemberg Cooperative State University), Andrea Honal (Baden-Wuerttemberg Cooperative State University) and Dirk Ifenthaler (University of Mannheim and Curtin University) investigate the usability of MyLA (My Learning Analytics) app prototype. “Mobile learning analytics in higher education: usability testing and evaluation of an app prototype” provides insights into the MyLA app design which targets to improve learning processes at higher education institutions. MyLA provides ubiquitous communication in form of short messages from students to their lecturer and vice versa. This is especially useful for dual system courses where students are often away from the campus.

“Using mobile devices to support cognitive apprenticeship in clinical nursing practice – a case study” by Chin-Yuan Lai (National Taichung University of Science and Technology) and Yung-Chin Yen (Tainan First Senior High School) aims to illustrate how mobile devices could be applied to substantiate cognitive apprenticeship model to optimise nursing students’ learning experiences in clinical settings. Findings show that the use of the mobile technology promotes the effectiveness of cognitive apprenticeship model, especially for processes of reflection, coaching, scaffolding and articulation.

Concluding this special issue is a paper by Maria Cutumisu (University of Alberta), examining the impact of the informational value of feedback choices on students’ performance. The “Informational value of feedback choices for performance and revision in an assessment game” suggests that critical uninformative feedback is associated with students’ performance and critical informative feedback is associated with their learning strategies. The findings may support the design and implementation of agents for providing adaptive feedback in digital learning environments.

Overall, these five selected papers in this special issue demonstrate multiple perspectives and approaches on implementing data analytics and digital learning in productive systems of educational institutions. We are hopeful that this special issue contributes in a substantive way to the discourse and research with regard to advanced technologies and innovative approaches to learning and teaching in the twenty-first century.

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