Guest editorial

Supporting higher education students through analytics systems

Learning analytics and (big) data in higher education are emerging topics, however, empirical evidence as well as organisation-wide implementation are still scare (Ifenthaler, 2017). Research on student retention has been conducted predominantly in English-speaking countries such as Australia, UK or USA (e.g. Bean, 1982; Krause *et al.*, 2005; Mah *et al.*, 2019; Tinto, 1993). Findings highlight that students may benefit from analytics systems through personalised and adaptive support during their learning journey (Ifenthaler, Yau and Mah, 2019). For example, students often enter higher education academically unprepared and with unrealistic perceptions and expectations of academic competencies for their studies. Both, the inability to cope with academic requirements as well as unrealistic perceptions and expectations of university life, in particular with regard to academic competencies, are important factors for leaving the institution prior to degree completion (Mah and Ifenthaler, 2018).

Analytics systems for supporting learning and teaching in higher education are slowly moving towards a mature field of research and development (Ifenthaler, Mah and Yau, 2019; Schumacher and Ifenthaler, 2018a, b; Schumacher *et al.*, 2019). This broader (and system wide) adoption of analytics system provides new testbeds for empirical research and areas of new discoveries for the learning as well as data sciences (Mah *et al.*, 2019).

This special issue brings together the scholarly research and theory focusing on contemporary issues related to analytics system and how they support students' at higher education institutions. The contributions provide insights into how educational data, analytics systems and advanced digital technologies contribute towards successful learning and teaching scenarios at higher education institutions.

Paper selection process

In summer 2018, a call for submissions was circulated through electronic mailing lists of the following organisations: AECT (Association for Educational Communications and Technology), AERA (American Educational Research Association), ASCILITE (Australasian Society for Computers in Learning in Tertiary Education), as well as through the regular channels of educational technology groups. The call defined the focus of the potential submissions as follows:

- Do analytics data change student behaviour (e.g. learning strategies) and dispositions (e.g. motivation, emotion)?

- Understanding the learning journey of higher education students.

- Leveraging assessments analytics for personalised feedback.

- Linking analytics data and study success.

- Building evidence for graduate analytics.

- Change management for data analytics at higher education institutions (e.g. implementation strategies, requirements).

Initially, 16 abstracts were submitted by the end of September 2018. Upon careful review and agreement among the advisory board, nine of them were invited to submit a full manuscript by the end of November 2018. Main criteria for the selection of manuscripts was a clearly articulated focus on analytics systems for supporting students in higher education and how well this focus was consistently enunciated throughout the proposed work. Each manuscript was assigned to at least three reviewers of the special issue review board and additional reviewers for the *Journal of Applied Research in Higher Education*. All of the initial reviews were completed by the end of March 2019. Based on the comments of the reviewers and on the individual feedback of the guest editor, the manuscripts were moved to the second round of reviews. Authors were asked to submit their revised manuscript by the end of May 2019 addressing the comments from the reviewers and from the guest editor. The final acceptance of manuscripts was completed by the end of June 2019.

Contributors to this special issue

This special issue starts with a research paper by Andrea Parrish and Laila Richman, "Dual perspectives on learning analytics in higher education", which suggests perspectives on learning analytics from an administrator and a faculty member. The dual perspectives help to further the dialogue between university administration and faculty as analytic systems become more widespread.

Liz Bennett and Sue Folley present in their research paper, "Four design principles for learner dashboards that support student agency and empowerment", a student-centred perspective to understanding the range of ways that students respond to receiving information about their learning behaviours presented on a dashboard. The four principles are: designs that are customisable by students; foregrounds students' sense making; enables students to identify actionable insights; and dashboards are embedded into educational processes.

"Motivating online students through peer-comparison progress dashboards" is a practitioner report by Paula Smith sharing student and tutor perspectives on the use of dashboards to increase online students' motivation, and it examines whether the benefits of a peer-comparison dashboard are reserved for high-achieving students.

The practitioner paper, "Learning analytics for student reflection and course evaluation", by Devrim Ozdemir, Heather Opseth and Holland Taylor demonstrates a process of faculty utilisation of learning analytics by evaluating students' course objective achievement results to enable student reflection, student remediation and faculty curriculum evaluation. Learning analytics enabled meaningful conversations focusing on course learning objectives and provided detailed information on each student. The learning analytics tool also provided detailed information regarding which areas faculty needed to improve in the curriculum.

Aklilu Tilahun Tadesse and Pål Davidsen present in their research paper, "Framework to support personalized learning in complex systems", a design framework applied to the creation of a personalised and adaptive online interactive learning environment. Findings suggest that the use of personalised and adaptive learning tools support learning about complex systems.

"What do first-year students need? Digital badges for academic support to enhance student retention" is a research paper by Dana-Kristin Mah and Dirk Ifenthaler investigates data on first-year students' needs regarding academic support services and reasons for their intention to leave the institution prior to degree completion. It is suggested that higher education institutions can create digital badge programmes, which may improve communication of academic requirements and may also serve as a platform for a staff-student conversation about expectations and demands for a successful first-year experience.

The research paper by Robert DeMonbrun, Michael Brown and Stephanie Teasley, "Enrollment patterns and students' risk of academic difficulty", expands upon an existing framework that investigates students' academic difficulty in co-enroled courses by adding additional co-enrolment variables that may influence academic performance in introductory

gateway courses. The authors provide a generalisable methodology that can be used by other institutions to investigate curricular pathways that have the potential to increase study success.

"Shaping minds without changing behaviours: predictive analytics in a university english course" is a research paper by Dennis Foung which investigates students' perceptions of the course diagnostic reports tool and whether they plan to act on the recommendation. The findings provide useful insights for early alert system designers to establish a system for generating practical recommendations for students.

The final research paper, "Dropout in programming courses – prediction and prevention", by Anja Hawlitschek, Veit Köppen, André Dietrich and Sebastian Zug identifies activity patterns that indicate students at risk and investigates reasons behind specific activity pattern. The findings indicate a link between activity patterns and learner characteristics. Instructional interventions to support students and to prevent dropouts are suggested.

The nine papers cover a wide range of contributions focussing on supporting higher education students through analytics systems and provide empirical evidence as well as practical implications for an emerging field in higher education research. The theoretical foundations, insightful findings and innovative frameworks, as well as practitioner reports shall inspire future high-quality research studies and contribute to the growing knowledge base of educational technology, learning analytics, and higher education learning and teaching practice.

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