A blended learning model for first year science student engagement with mathematics and statistics

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With the rapid decline of the enrolments in the conventional, campus-based courses, many higher education (HE) institutions around the world opt for provision of dual learning and teaching modes, most often offering fully online experiences in off-campus courses (distance education), and hybrid/ blended learning experiences in on-campus courses. This raises questions related to the quality of technology-enhanced learning (TEL) and teaching experiences (Laurillard, 2009; Kirkwood, 2014). TEL is maturing and entering a normalisation phase, with modes such as blended learning expected to become the "new traditional model" or "the new normal" of course delivery mode (Porter et al., 2016) within one or two years (Johnson, Adams Becker, Estrada & Freeman, 2015). This normalisation shifts research paradigm from investigation of the ways the ICTs are used within educational settings to more focused analysis of pedagogical aspects impacting the design and implementation of the integrated ICTs. A rigorous, research-informed investigation is needed to scrutinise factors influencing effective integration of ICTs in the curricula, impact the integrated ICTs have on both teaching and learning, their effectiveness within current environment and the transferability/ adaptability of developed model(s) to other contexts (Kirkwood, 2014).

This presentation reports on an informed inquiry investigating the effectiveness of the redesigned technology-enhanced learning and teaching environment in promoting student engagement in a compulsory quantitative methods unit for first year science undergraduates offered at a large, metropolitan university. A blended learning model was adopted including pre-lecture readings, didactic lectures, self-paced computer labs with demonstration videos, collaborative workshops, fortnightly online quizzes, and problem solving tasks based on realistic quantitative analysis. Teaching resources were highly structured and made available to students using Adaptive Release feature, a part of the University's Blackboard Learning Management System. The Adaptive Release was introduced to foster students' engagement and encourage students' self-regulated learning, with focus on assisting students with resource development of management strategies. Quantitative data was collected through access logs on the Blackboard Learning Management System, social media activity within closed groups, an

investigation of mathematical background at admission, workshop attendance and unit assessment results. The data analysis used statistical modelling which allowed researchers to demonstrate correlations between student's preparedness level, engagement and success.

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