Editorial

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Learning analytics in massively multi-user virtual environments and courses

There is much ongoing interest in big data and the role it can play in decision-making in diverse areas of science, commerce and entertainment. By employing a combination of modern artificial intelligence, machine learning and statistics techniques, extremely large and complex data sets can be 'mined' in a variety of ways to reveal relationships, patterns and insights not easily discoverable through standard database management tools and data processing applications. In education, data mining approaches have been applied to the analysis of electronic stores or repositories of student data for a number of years now (Romero & Ventura, 2007), but this has been occurring largely at the institutional or sector level. Such applications, which are sometimes referred to as 'academic analytics' (Campbell, DeBlois, & Oblinger 2007; Goldstein & Katz, 2005), have not become mainstream, being relevant mainly to governments, funding agencies and institutional administrators rather than students and teachers (Siemens *et al*., 2011). More recently, a new field known as *learning analytics* (Long & Siemens, 2011; Siemens *et al*., 2011) has emerged that seeks to generate knowledge 'about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs' (Siemens, 2011, para. 5). This knowledge can be employed for a range of purposes, among which are to allow learners to reflect on their activity and progress in relation to that of others as well as to assist teachers and support staff in predicting, identifying and supporting learners who may require additional attention and intervention (Powell & MacNeill, 2012).

Occurring in parallel is the burgeoning trend towards the delivery of education and learning at a 'massive' scale. The last decade has seen an explosion of activity in the use of massively multiplayer online games (e.g. World of Warcraft) and virtual worlds (e.g. Second Life) for both formal and informal learning (Childress & Braswell, 2006; Dalgarno & Lee, 2010). These *massively multi-user virtual environments* (MMVEs) are rife with opportunities for exploiting learning analytics methods to produce enhanced outcomes and experiences for students. At the same time, we have been witnessing a movement in which many universities and colleges, including some of the most prestigious institutions of higher learning in the world (e.g. Harvard, Stanford, MIT and the Universities of Melbourne, Toronto and Edinburgh, to name a few), are 'opening up' their course offerings to massive numbers of participants on the Internet (see, for example, Brown, 2013; Daniel, 2012; Jona & Naidu, 2014; McAuley, Stewart, Siemens & Cormier, 2010; Siemens, Irvine, & Code, 2013). In such *massive open online courses* (MOOCs), the involvement of hundreds, thousands or even tens of thousands of students creates a heighted imperative to formulate alternative strategies for feedback and assessment that are less reliant on individual teachers. Learning analytics have the potential to be used in MOOCs to facilitate new models of self and peer assessment as well as to make possible the implementation of automated mechanisms to support and augment students' self-regulated learning goals and processes.

This special issue of JCAL addresses the intersection of learning analytics on one hand and MOOCs and MMVEs on the other, its primary goal being to help foster and encourage the interdisciplinary dialogue and exchange needed to bring together the various contributory bodies of knowledge encompassed by the two domains. The six articles contained within the issue individually and collectively highlight both the predictive and prescriptive capabilities of learning analytics as applied to 'massive' situations, demonstrating how they can be harnessed in different ways to assist us in better understanding, and thus better serving, learners and learning.

The special issue opens with an article by Saif Rayyan, Colin Fredericks, Kimberly Colvin, Alwina Liu, Raluca Teodorescu, Analia Barrantes, Andrew Pawl, Daniel Seaton and David Pritchard, who present a case study of an introductory physics MOOC based on blended pedagogy that evolved from materials originally created

