

Predicting Student Satisfaction and Outcomes in Online Courses Using Learning Activity Indicators

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ABSTRACT

The premise for this study was that learner interaction in an online web-based course could be assessed in relation to academic performance, or in other words, e-learning. Although some studies reveal that learner interaction with online content is related to student academic performance, it remains unproven whether this is casual, or even if there may be a significant correlation. Thus, this study seeks to measure if there is a directional and then a casual relationship between student online academic performance, engagement analytics and other online activity factors. A unique aspect of this study is that data is collected from Moodle engagement analytics as well as from the activity logs. Student academic performance is measured based on the grade achieved from an assessment designed to map to the course learning objectives.

KEYWORDS

Academic Performance, Big Data Learning Analytics, E-Learning Undergraduate Business Course, Online Web Based Course, Student Learning Performance

INTRODUCTION

Learning analytics have been applied to study and visualize the relationship between student activity and performance in online-based university-level courses during the last decade (Dyckhoff, Zielke, Bültmann, Chatti & Schroeder, 2012; Ferguson, 2012; Gunn, 2014; Nieto Acevedo, Yuri Vanessa, Montenegro Maran & Enrique, 2015; Retalis, Papasalouros, Psaromiligkos, Siscos & Kargidis, 2006; Scanlon, McAndrew & O'Shea, 2015). The authors of 11 relevant studies published in peer-reviewed scholarly journals all found some benefits but they also cited many problems when trying to assess student learning through combinations of learning analytics, learning management system (LMS) activity data logs, and graded performance results (Agudo-Peregrina, Iglesias-Pradas, Conde-Gonzalez & Hernandez-Garcia, 2014; Fidalgo-Blanco, Sein-Echaluce, Garcia-Peealvo & Conde, 2015; Gomez-Aguilar, Hernandez-Garcia, Garcia-Pealvo & Theren, 2015; Iglesias-Pradas, Ruiz-de-Azcarate & Agudo-Peregrina, 2015; Nieto Acevedo et al., 2015; Reyes, 2015; Ruiparez-Valiente, Mua-Merino, Leony & Delgado Kloos, 2015; Scheffel, Drachsler, Stoyanov & Specht, 2014; Xing, Guo, Petakovic & Goggins, 2015; Yahya, Messoussi & Touahni, 2015).

Each of those scholarly manuscripts cited above made unique contributions to the literature beyond visualizing inferential deductions that previous GPA predicts future GPA. In addition to explaining how learning analytics may be used to measure and visualize student learning activity in online courses, all of those researchers raised the concern that deep learning may not be reliability predicted by learning analytics. In fact, only two groups of researchers (Agudo-Peregrina et al., 2014; Gomez-Aguilar et al., 2015) found any statistically significant correlation relationships between student

online activity reported in learning analytics and academic performance. More than one researcher confirmed there was no statistically significant relationship between learning analytics, LMS activity data and student learning outcomes (Iglesias-Pradas et al., 2015). Therefore, more studies are needed to test if learning analytics data could relate to or predict student performance.

It is difficult to generalize either the positive, negative or null findings of the above studies towards any business school population due to the differences in the research design, unit of analysis, LMS context and subject matter disciplines from which the samples were drawn. For example, only a few studies tested for and used objective measures of student learning performance for the dependent variable. All of those researchers called for more studies to further explore how learning analytics and LMS data could be utilized to assess student performance.

There are numerous empirical studies published in scholarly peer-reviewed journals beyond the scope of learning analytics where researchers have found statistically significant links between student performance in online courses and activity-related factors (Blumenthal et al., 2014; Chang, Wu, Kuo & You3, 2012; Farrington, 2014; Gibson & Dunning, 2012; Hu, Lo & Shih, 2014; Kaufman & Schunn, 2011; Lu & Law, 2012; Lu & Zhang, 2012; Mirriahi & Alonzo, 2015; Pombo & Talaia, 2012; Russell, 2015; Shih, 2011; Strang, 2010, 2011, 2013a; Thomas, Reyes & Blumling, 2014; Wichadee, 2014; Zacharis, 2015). Thus, there may be relevant concepts in other domains that show how student activity in online courses may be related to estimating performance as well as how that knowledge could be applied to improve teaching.

A few pertinent empirical studies have uncovered some relationships between student performance and online activity in Moodle (Dierenfeld & Merceron, 2014; Ferguson & Buckingham-Shum, 2012; Hatala, Gasevic & Joksimovic, 2014; Iglesias-Pradas et al., 2015; Strang, 2013b). Moodle, the popular open source LMS developed in Australia, now features a learning analytics module called “engagement analytics” (J. Dimopoulos, 2015, p. para 1; Moodle, 2015). Other third-party learning analytics tools are available at cost and the free applications remain untested in Moodle (Hatala et al., 2014; Nieto Acevedo et al., 2015; Reyes, 2015; Ruiparez-Valiente et al., 2015; Yahya et al., 2015). At the time of writing there were no studies the examining learning engagement module in Moodle.

Several researchers recently studied how learning analytics in Moodle may be used to visualize student activity (Dimopoulos, Petropoulou, Boloudakis et al., 2013; Dyckhoff et al., 2012). Those studies demonstrated the visualization capability of learning analytics in Moodle but it remains unclear if student learning performance is statistically related to the online activity. This gap in the literature is addressed by the current study as guided by the research question: Can online student learning performance be reliably predicted by learning engagement analytics in Moodle? The sample will be drawn from a business school but the results may generalize to other disciplines since the focus of this study is on the approach of testing if learning analytics data can be linked with student performance.

LITERATURE REVIEW

First the term learning analytics is defined from the literature. Next the most relevant empirical studies are reviewed to develop the factors and hypotheses for the current study. The scope of the review is to identify pertinent empirical studies that use Moodle activity data or learning analytics in some way to assess student performance or learning outcomes during online or hybrid courses at the university level.

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