

Chapter 35

Improving Online Course Performance Through Customization: An Empirical Study Using Business Analytics

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ABSTRACT

The number of educational courses offered online is growing, with students often having no choice for alternative formats. However, personal characteristics may affect online academic performance. In this study, the authors apply two business analytics methods - multiple linear/polynomial regression and generalized additive modeling (GAM) - to predict online student performance based on six personal characteristics. These characteristics are: communication aptitude, desire to learn, escapism, hours studied, gender, and English as a Second Language. Survey data from 168 students were partitioned into training/validation sets and the best fit models from the training data were tested on the validation data. While the regression method outdid the GAM at predicting student performance overall, the GAM explained the performance behavior better over various predictor intervals using natural splines. The study confirms the usefulness of business analytics methods and presents implications for college administrators and faculty to optimize individual student online learning.

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INTRODUCTION

The Internet has grown to influence all walks of life, including scientific research, communication, business, industry, entertainment and education. Today there are 3.2 billion Internet users consisting of 44.3% of the world population (InternetWorld Stats, 2015). With such a global reach, the Internet is one of the favored media to provide education at reasonable costs. Hence, many universities are widening their course offerings, particularly their high-demand core prerequisite courses for their degree programs online. Massively Open Online Courses (MOOC) such as Coursera, edX and Udacity are also signing up millions of students (Jordon, 2014). But, student academic success has been elusive with an average of only 7.5% course completion rate in these online courses (Kolowich, 2013). One reason may be due to a lack of course customization (Kostromina & Gnedykh, 2016). The lack of a strong social presence is another factor (Kear, Chetwynd & Jefferis, 2014). Further, asynchronous and synchronous online learning environments also have differing impacts on the learning performance (Allmendinger, 2010). Most of the online course offerings today ignore customization to student needs and utilize a one-size-fits-all approach without considering individual ways students study and their preferences to communicate over the Internet.

According to Varre, Keane, and Irvin (2011), online learning programs focus on making interfaces easy to navigate, but fail to address individual student characteristics. This is where business analytics can play a useful role. By gathering data on the various types of student online interactions, systems equipped with analytics methods can learn to customize online presentations. Along with system customization factors, it is also necessary to know student background characteristics that are essential for performing well in an online course so that systems can match them to improve performance.

PRIOR RESEARCH

Among factors that have been found to affect a student's level of success are: course prerequisite preparation (Marcus, 2013), time management skills (iSeek, 2015), technology infrastructure (Kukulska-Hulme & Jones, 2012), course content, structure and delivery (Teng, 2008). Other factors include getting familiar with the technology platform and course set up early, maintaining regular communication with the instructor, committing to consistent online study sessions, initiating ties with coursemates, university policies and netiquette (Harrell & Bower, 2011; Harrell & McClinton, 2016). We can group the above factors broadly into two categories: 1) System factors, and 2) Student background characteristics.

System Factors

According to Moore and Kearsley (2012), an online education system involves technology, courses, students, instructors and administrators. Technology includes access and software, whereas courses cover content and pedagogy. Students need to have prerequisite characteristics such as communication abilities and motivation. Instructors are to be technologically proficient and committed, and administrators must provide resources (Tirziu & Vrabie, 2015). Currently, many online systems are asynchronous implying students are separated geographically and in time. Synchronous systems may allow video and voice, either pre-recorded or in real time, to simulate a classroom (Latchman, Akkaraju & Gharbaran, 2010). Such systems can also capture social presence very effectively (Kear, Chetwynd & Jefferis, 2014). Lo,

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