A Propensity Score Model to Evaluate the Downstream Performance of Students in General Education Online Courses in a University System

Saul G. Alamilla  
Department of Psychology  
Kennesaw State University  
salamil1@kennesaw.edu

Bradley J. Barney  
Department of Statistics and Analytical Sciences  
Kennesaw State University  
bbarney2@kennesaw.edu

Humayun Zafar  
Department of Information Systems.  
Kennesaw State University  
hzafar@kennesaw.edu

Abstract

Questions about the efficacy or quality of online education are timely as universities and education budgets continue to dwindle and student enrollments continue to grow in many institutions across the country. As part of a large study involving over 30 state institutions in a university system, we present a unique and novel statistical approach to dealing with confounding variables and self-selection issues in the evaluation of online college courses, known as propensity score (PS) matching. We focus on student success in subsequent course(s) as a function of an online format vs. a face-to-face format among students enrolled in 30 state universities in a university system in the Southeast, another unique methodological feature not captured in previous studies. For example, if a student takes IS 101 online, how does he/she fare in IS 102 taken face-to-face? We focused on two groups. The first one, which is supported by the state, imparts general education curriculum online. We will refer to that program as GenEdOne from here on. GenEdOne is administered by a single university. One thing to note about GenEdOne is that it is offered at a reduced cost to a student. All students in the state system are eligible to take those courses, with articulation agreements set in place for credit transfer. The second group of students took either face-to-face courses or hybrid courses at the institutions they were enrolled in. We will refer to that group as GenEdTwo. We focus on English Composition I and English Composition II. We use PS matching to addresses issues of confounding and self-selection in the estimation of the effects of GenEdOne on downstream performance—issues that plague observational data such as ours. Because the “treatment” (in this case GenEdOne) was observed and not assigned, it is reasonable to expect systematic differences between treated and non-treated (i.e., control group), which can impact the outcome. PS matching balances measured confounding variables. The PS allows one to predict receipt of the “treatment” based on measured covariates. The PS produces a one-score summary of all measured potentially confounding covariates that predict the treatment. The treated and non-treated groups are then matched in terms of their PS and, finally, the effects of GenEdOne are modeled in a regression analysis. During the TREO Talk, we will present our final results.