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The effect of blended courses on student learning: Evidence from introductory economics courses

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ABSTRACT

This study examines the effect of blended coursework on student learning outcomes in introductory economics courses. The effect of blending on learning is determined by comparing scores on quizzes and exams between students in a blended course (the treatment) and students in a traditional face-to-face course (the control). This study accounts for the potential bias due to non-random selection into treatment by using propensity score matching. The results indicate no significant effects of blending on student learning.

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1. Introduction

There has been a shift in higher education toward more fully online and blended courses in recent years. While they have been defined differently in the literature (Garnham and Kaleta, 2002; Garrison et al., 2002; Williams, 2002), it is commonly accepted that blended or hybrid courses integrate traditional face-to-face class sessions with online class components which take the place of some class time. An extensive Sloan Consortium survey found that in 2004 almost 55% of institutions offered at least one blended course. Moreover, in the same year 79% of public institutions offered at least one blended course (Allen et al., 2007).

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Given this extensive shift toward online and blended learning, the question of primary importance is the level of student learning in this setting compared to a traditional face-to-face (F2F) course. While the research on this question is extensive across disciplines, it is very limited with respect to economics. This study draws from the advisory literature on how best to develop and deliver a blended course and from other disciplines on assessment of learning in a blended course to fill a gap regarding the effectiveness of blended learning in economics.

To determine the effectiveness of blended coursework, we compare the learning outcomes for students enrolled in principles of economics courses (both micro and macro) in the 2011/2012 academic year. Of the seven sections that were examined, two were blended. The remaining sections serve as the control group, and were F2F courses. Data on student performance were matched with university transcript and enrollment information to provide additional controls. Using these data, we estimated the differences in learning outcomes across modes to determine the effect of blending on learning.

This study will advance the literature in the field in four ways. First, it is a current study of blended learning in economics, informed by blended learning literature across disciplines. Second, our methodology controls for the selection bias found in previous studies of online versus F2F learning, but for which previous studies on blended learning fail to account. We use propensity score matching (PSM) to recover the causal effect of blending on student learning. Further, we provide evidence that the PSM specification accounts for the non-random selection into treatment by estimating Imbens bounds (Imbens, 2003) to determine how important an unmeasured selection variable must be to undermine our conclusions. Third, we clearly specify the similarities and differences between the blended courses and the F2F courses. Finally, we target and assess a specific student learning objective.

With few exceptions, our findings suggest no significant difference in learning between blended and F2F sections. Most of the estimated treatment effects are both statistically insignificant and small in magnitude, regardless of estimation technique. While these results are consistent with the literature, our results also suggest the presence of sizeable selection bias; in most cases, OLS estimates of the treatment effect overstate the effect of blending.

The paper proceeds as follows: Section 2 reviews the literature, Section 3 outlines the experiment and data collection, Section 4 explains the data and descriptive statistics, Section 5 discusses the estimation strategy, Section 6 provides the results, and Section 7 concludes.

2. Literature review

The vast literature on the effects of blended course delivery reveals a mix of benefits and costs. On the positive side, evidence shows that blended courses provide students with time flexibility and improved learning outcomes, afford more student-teacher interaction, increase student engagement, allow for continuous improvement in a course, enhance an institution's reputation, expand access to educational offerings, and reduce operating costs (Vaughan, 2007). Consistent with Vaughan's findings, a meta-analysis across disciplines conducted by the US Department of Education found statistically stronger learning outcomes in blended classes compared to F2F classes (Means et al., 2009). Moreover, Arbaugh et al. (2009) conducted a meta-analysis specific to the use of online and blended learning in the business disciplines. They found that as online and blended learning courses become more prevalent, any negative performance differences between F2F and online or blended classes diminished or shifted to favoring the latter, suggesting a learning curve in development and completion of technology-assisted courses. However, the benefits of blending are not without costs. Some of the documented costs are students' struggles with time management and responsibility for their own learning, difficulty using new technology, an increased time commitment from faculty, inadequate professional development support, resistance to organizational change, and difficulties establishing a supportive culture for blended learning (Vaughan, 2007).

Compared to other disciplines and the literature as a whole, there are relatively few studies on blended or fully online delivery in economics. Of these studies, there are two primary categories: web-based enhancements to F2F classes and comparisons of the outcomes in online or blended versus F2F

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