

## Switching Economics Courses from Online Back to the Classroom: Student Performance and Outcomes

**Richard Vogel**

Department of History, Economics & Politics  
Farmingdale State College  
2350 Broadhollow Road  
Farmingdale, NY  
USA

### Abstract

*Online courses offer a number of obvious advantages to students in terms of scheduling and flexibility. Interactions between the instructor and student in an online course though tend to be more limited and strictly defined than they would be in the traditional classroom. Hybrid formats offer greater flexibility and variety for student-instructor interactions and learning exercises than the online format while still retaining some scheduling flexibility. This discussion assesses differences in student performance and outcomes across a sample of 7 sections of a Sports Economics course that over the last five academic years has been offered online, in the traditional classroom, and as a hybrid course. The analysis finds that students in an online course were likely to have scored 16 percent higher than students that took the same course in the traditional classroom. Students in the hybrid format were likely to have scored 4 percent lower than the students in the traditional classroom.*

**Keywords:** Economics education, online teaching, hybrid courses, student performance

### 1. Introduction

Over the last decade the number of courses and institutions offering online instruction has increased dramatically. Online courses offer a number of obvious advantages to both students and institutions in terms of scheduling and flexibility enabling students to more fully integrate their academic pursuits into their lifestyles. Given the capital and facility constraints facing many campuses and the competitive market for students, educational institutions have been compelled to enter the online education market (even if they are not offering fully online degree programs) in order to satisfy the growing demand by their students. The online class environment differs greatly from the traditional classroom. In the traditional classroom, even after completing the syllabus and explaining to the students the required work and activities for the course, the instructor has a great deal of flexibility on which particular aspects of the course content to focus upon in any particular class meeting, how to present the material, and even the types of exercises students will participate in during a class meeting. Online, where instructor and student interactions are generally asynchronous, class assignments and activities, discussion boards, and research projects must be clearly explained at the start of the semester, before students take off on the wrong tangent. While the increasing sophistication of online course management systems does allow instructors to make use of a wide range of instructional modalities including audio and video materials, most of the work and instruction online is still through the written medium. Student-instructor interactions are more formalized, and changes or modifications to course content, assignments, and other activities are not easily introduced.

The hybrid format, which involves a combination of both online and face-to-face class meetings offers many of the benefits that online courses do for students, but also a greater level of instructor-student interaction and options for flexibility. As the use of course management systems by college instructors has increased, the distinction between course formats has begun to blur. For instructors already using some form of blended learning in their courses, the distinguishing characteristic between the hybrid and traditional face-to-face format is the amount of time that the instructor has to spend with the students in the classroom. A three credit hour course that would normally meet twice a week for 75 to 90 minutes (depending on whether the campus has a 15 or 16 week semester), will now go to meeting once a week for one class period. A growing number of studies examining the differences in outcomes of online, traditional and hybrid courses has developed over the last decade. Studies such as those by Anstine and Skidmore (2005) find that online courses appear to be less effective than traditional face to face courses. On the other hand, Harmon and Lambrinos (2006) find that there are some significant difference in human capital skills between online learners and students opting for the traditional classroom experience. DeLoach and Greenlaw (2007) and Bishop, Hyclak and Yerk-Zwickl (2007) suggest that the most effective learning environment is a based on a learner centered teaching methodology.

Their analysis indicates that student achievement and outcomes are higher when the instructor serves more to guide students to critically assess and analyze the course material, making students more responsible for their own learning. Bishop, Hyclak and Yerck-Zwickl do find that while this mode of teaching is more effective, it does lead to higher levels of student withdrawals from the course. Harmon and Lambrinos (2007; 2008) and Wachenheim (2009) evaluate the differences in outcomes on proctored and non-proctored exams between online and face to face courses. The results of these studies suggest that exam scores tended to be higher in online exams than on proctored exams. Online students taking proctored exams tended to score lower than face to face students did on the same proctored exams. Harmon and Lambrinos also suggested that there was the greater probability of cheating taking place in online non-proctored exams than in proctored exams in both the online and traditional face to face or hybrid courses.

While the hybrid format appears to strike a balance between both online and traditional teaching methodologies, there are issues and questions regarding which activities to put online or move to the classroom. As instructors integrate course management systems more completely into the traditional classroom as well, the question of which activities and materials to relegate to the online system and which to keep in the classroom are of considerable importance. Should regular lectures be conducted, or should the classroom be reserved primarily for discussion of the material? Will students be motivated enough to complete reviewing materials prior to class so that effective and meaningful discussions can take place? Should proctored exams be held in class or would it be more effective to hold non-proctored exams online?

While the aforementioned questions underlie and motivate the analysis for this paper, they describe pedagogical issues that do not have definitive solutions. Using a grade production function, where the final grade earned for the course represents a measure of the student's mastery of the concepts and material covered during the semester I focus upon the question of whether the learning environment impacted student performance across the three different teaching formats. The next section of this paper provides the background to the Sports Economics course that is used as the basis for the analysis. Following that is a discussion of the course structure in the three different teaching environments. Section 4 presents the analysis of the grade production function. The conclusions are presented in the final section of the paper.

## ***2. Sports Economics Courses at the College***

The Sports Economics course at Farmingdale originally began in 2002 as a combined Sports and Entertainment Industry economics course which was simply a general elective for students in all majors that just needed to satisfy upper level arts and sciences credits in order to complete their four degree programs. Within the first year of teaching the course, it became apparent that the course should be split in two. Since 2004, the department has offered ECO 303: Arts and Entertainment Economics, and ECO 304: Sports Economics. During the same time period, the Business Management program began to offer a minor in Sports Management, which included the Sports Economics course as an option. Several years later Sports Management became a concentration within the B.S. program in Business Management, with Sports Economics as one of its required courses. More recently, the campus received approval to offer a full-fledged B.S. degree program in Sports Management retaining the ECO 304 as a required course. Prior to the advent of the B.S. program in Applied Economics on campus in 2008, the department only offered service courses.

Even after the start of the Applied Economics program which while it has experienced steady enrollment growth, is still relatively small compared to many other bachelors' degree programs on campus, it is difficult to offer more than two or three 300 level economics electives in any given semester. However, when economics electives were offered online, students tended to register for them – and this is especially true of the Sports Economics course. Since 2006, the course has been offered online every intersession, and either in an online or classroom setting during either the fall or spring semester almost every academic year as well. Beginning with the 2009-2010 academic year with the advent of a new course management system faculty were allowed to offer courses in a hybrid format. Thus, the course was offered in the hybrid format for the first time during the spring 2011 semester. The specific format for instruction and timing of when the course would be offered was based on the instructor's pedagogical and scheduling preferences for the particular semester in question. With the advent of the four year degree program in Sports Management it became important to ensure that the course was offered regularly in both some type of classroom setting (not all students prefer the online environment) as well as the online format.

### **3. Structure of the Sports Economics course: Online, Hybrid, & Traditional**

The main difference between the Sports Economics courses taught online during any particular semester has been the time frame in which the course is taught. During regular fall and spring semesters, the courses run for between fifteen to seventeen weeks depending upon the holiday schedule for the particular semester. The sports economics course has typically consisted of eight full modules of substantive material and assignments that are generally open for students to work in at two week intervals. There are also four modules consisting of a mid-term essay, final essay, audience review journal, and an online student feedback/evaluation questionnaire. Alongside the required textbook for the course, there are a number of required readings ranging from short newspaper articles to journal articles, and these are all contained in their own separate module online. For the intersession and summer semesters, all of the same material and modules are present, but the specific amount of work that students must complete and time frame that students have to complete it in are truncated to fit the roughly three week period of the intersession, or the five (or eight) week format of the summer. In practice, this generally means that the audience review journal activity is reduced from students being required to attend four sporting events, to a requirement of attending one or two events and watching one event on television. It also means that there are a number of overlapping modules where students work in two or more modules during the same week instead of working through the material sequentially.

The course materials and structure of the traditional face to face course is very similar to the online course with the course split into eight distinct topics with approximately two weeks for each topic area. The textbooks, articles and other assigned readings, and the general assignments are the same. However, in the traditional classroom, lectures are conducted face to face, and PowerPoint slides are posted to the course website (maintained in the same course management system that is used for online instruction) after they have been conducted in class. Students complete two in class essay exams, submit six written assignments online, and submit their audience review journal in class in hardcopy. Classroom activities consist of a mix of class discussion and lecture with some occasional group exercises. The hybrid classroom consisted of a balanced mix between the traditional face to face class and the online environment. In the hybrid environment, class time was allocated to approximately one-half hour of PowerPoint lectures (with audio and video clips included) plus forty-five minutes of class discussion of specific topics and assigned readings. Additionally, online essays were moved to the classroom where they could be fully proctored. Some written assignments were still conducted strictly online, and the course website included both a number of mini-lectures plus PowerPoint slides from the in-class lectures (posted after the respective class).

Both the hybrid and traditional courses are very similar – utilizing essentially the same sets of course materials and even the same assignments that the students accessed through the online course management system. The primary difference between the two was the students enrolled in the hybrid format spent half as much time in the classroom as students enrolled in a traditional course. Traditional face to face courses in Sports Economics have generally been scheduled as one night a week for 150 minutes, while the hybrid course was schedule one night a week for 75 minutes. Thus, lectures in the in the traditional course have been more in-depth. The hybrid course relied more on in-class discussion with shorter lectures. In the online class setting, students are more responsible in a sense for their own learning. While there are mini-lectures which serve to raise questions and provide students with some of the key principles and concepts from the assigned readings, students were required to participate in regular online (asynchronous) discussions of the material demonstrating their ability to introduce and employ key concepts to a myriad of focused issues and problems such as ticket pricing, players' salaries, and the efficacy of government subsidies to professional sports teams (stadium building). These discussions while in and of their own right, an important component of the students final grade, serve to prepare the students for the issues and problems that they face on the assigned midterm and final essays, as well as for completing their audience review journal assignments.

Assessing the differences in outcomes between these three modes of instruction is of increasing importance. The flexibility that students and faculty gain by having the option of taking or offering courses in any one of these formats is of great value to educational institutions. For part-time and full-time working students attending traditional four year colleges, online courses may allow these students to complete required and elective courses without having to sacrifice income – income that these students rely on to pay tuition and other education related expenses. Offering courses in any one of these formats may also provide greater scheduling flexibility to departments and institutions that face space and time constraints. Competitive pressures in the education marketplace though also make it necessary for institutions to offer courses in these various formats.

#### 4. Model and Analysis

Outcome differences between these modes of instruction can be assessed by evaluating a score production function. Let us assume that the grade a student obtains at the end of the semester depends upon a number of attributes such as innate abilities (A) and student work input (X) into the course, and course type (traditional, hybrid, or online – T). The student  $i$ 's score (grade) production function is

$$g = g(x, A, T), \text{ with } g_x \geq 0, \text{ and } g_{xx} < 0. \quad (1)$$

where  $g_x (\leq 0)$  is the marginal score/grade productivity with respect to student effort. Further assume that this function can be expressed as a Cobb-Douglas style production function of the form:

$$\log g = \alpha + \beta_1 \log x + \beta_2 \log A + \beta_3 \log T + \varepsilon, \quad (2)$$

where  $\alpha$  and  $\beta$  are parameters to be estimated, and  $\varepsilon$  is an error term.

The Sports Economics course has been taught almost twice a year now since the fall of 2005. Thus there is grade and course data for all of the students that have taken the course since its inception. While over 300 students have taken the course though, data does exist for some of the other variables. The SUNY-SLN system has changed the course management system so the time spent online (effort) by each individual student is not readily available for more than half of the observations. Additionally, course attendance data for all of the courses and students is not fully captured in the instructor grade spreadsheets. Specific student attributes such as student gpa, or major outside of gender are not readily available for all of the courses at this point in time either. Regressions of the estimating equation are conducted using a student's final grade, attendance (for online this is time spent online in the course environment taken from the student login reports), gender, and whether the course was online, hybrid, or traditional. All name descriptors have been stripped away from the data so there is no way to trace a particular grade back to the individual student.

The analysis is conducted across a range of both online and face to face classes from the fall of 2006 through the summer of 2011. There are a total of 179 observations from seven courses – one hybrid, three online, and three traditional courses (two of which utilized a course website and one which utilized the campus online course management system). Summary statistics for the variables are presented in Table 1. While the average grade is 69.69, the median score for a student is 82.7. Attendance (Attend) is measured as a percentage of total class time available. For a 3 credit online course in this analysis, this is assessed as the total number of hours (minutes) a student was logged into the course during the semester using 45 hours (2700 minutes) as the index standard. In order to access many of the course readings, participate in the discussions, and read through and submit assignments a student would need to be logged into the course. However, the student may also print out some of the course materials and work on them offline (such as the required essays) and login for a short time to submit their work. This though is very similar to what students would do in the traditional classroom where they prepare their work outside of the classroom. For the traditional and hybrid courses, attendance is taken simply as the total number classes the student attended divided by the total number of classes held during the semester.

All of the other variables in the analysis are dichotomous dummy variables for either individual student attributes (Gender), or course attributes (T). For Gender, the variable is equal to 1 for a female student and 0 otherwise. Only 18 percent of the students in the analysis are female. Twenty-five percent of the students were enrolled in intersession courses (INTERS), 37 percent were enrolled in online courses, and 17 percent were enrolled in the hybrid course. Several variants of equation 2 are estimated using both OLS and a censored Tobit analysis. Both results are reported below in Tables 2 and 3. Estimates on the coefficient on intersession were found not to be statistically significant, and thus it was dropped from the analysis. While Gender appeared to have a small positive impact on student grade, it was not found to be significant. However as the only student attribute variable available for the analysis, it was left in the estimating equation. Estimating the relationship in log form resulted in a loss of 22 observations – students that either had a grade of '0' and some attendance, or students that had both no grade and never attended the course.

The results for both the OLS and Censored Tobit estimates are very similar. Whether the course was offered in a face to face format or an online format does appear to matter with students in the online format having an edge in overall grade performance. There may be some self-selection issues regarding students taking these courses online – but since the course is a required component of many of these students' degree program and they do not know whether the course will be taught online or in the classroom in future semesters, many students likely enroll in the course when it comes up and fits into their planned graduation schedule.

Students in the online format though too, had greater ability to consult the whole range of course materials while completing course assignments as opposed to students in the traditional courses – especially in completing essay examinations. Attendance for both online and traditional face to face classes appears to be a significant and positive predictor of student performance. This result should be of no great surprise as it represents to some degree the level of student commitment and effort to completing the course. It is difficult to explain the negative and significant coefficient on the hybrid format (Equation 3). This format combines aspects of both traditional and online classes. However, given the more traditional face to face aspects of the class it is possible that students took slightly less responsibility for their own learning (which they cannot do in the online format) and reacted to the course as if it were more of a traditional classroom. Also, the fact that students now faced fully proctored closed book in-class exams may also have resulted in scores that were lower than in the online formats.

Elasticities for all of the variables are presented in the last column of both Tables 2 and 3. While the elasticity of attendance was calculated directly in the regression, point estimates of the elasticities of the other three variables were calculated at their respective means. The value for an online course indicates that if a student took the course online, their grade was likely to be 16 percent higher than if the course had been taken in the traditional classroom. It should also be noted that if a student took the course in the hybrid format, their grade was likely to be 4 percent lower than had the course been taken in the traditional format. As has been noted elsewhere in this paper, the online format does require a certain level of commitment and self-motivation on the part of a student to complete.

### **5. Conclusions**

Online and blended or hybrid learning models of course instruction have become a mainstay on the college campus. The critical issue facing faculty, administrators, and reaccrediting bodies regarding these teaching modalities is are they as effective as the traditional classroom. This question though, almost presupposes that the traditional face to face method of instruction is the most effective means of instruction, which itself is subject to some debate.

The results of the analysis presented above suggest that there are some differences in outcomes between the three modes of instruction. This is consistent with the existing literature on online versus traditional teaching formats (see for example Harmon and Lambrinos 2006; Harmon and Lambrinos 2008; Terry 2007). Specific causes for these differences are not readily identifiable from the data on the Sports Economics courses analyzed here, but I conjecture that they may arise from several sources including the level of individual responsibility or commitment required to complete an online course and self-selection issues. A separate regression analysis that included a variable for whether the course was offered in one of the truncated intersession semesters (not reported here) did not find any significant impact from the reduced time period for the course.

As an ever larger pool of instructors begins to make use of course management systems to not only teach online, but to supplement their traditional face to face courses, the differences between the three teaching formats has begun to narrow. Thus there is a continuing need to evaluate how to better leverage each of these instructional modes. The real question to be faced at this point is not necessarily which mode or format is better, but how can we as instructors use each mode or format more effectively.

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**Table 1: Summary Statistics**

	GRADE	ATTEND	GENDER	INTERS	ONLINE	HYBRID
Mean	69.69485	0.50866	0.178771	0.256983	0.368715	0.173184
Median	82.71429	0.556296	0	0	0	0
Maximum	100	1	1	1	1	1
Minimum	0	0	0	0	0	0
Std. Dev.	30.95368	0.337662	0.384235	0.438196	0.48381	0.379468
Skewness	-1.39336	-0.07185	1.676734	1.112281	0.544235	1.727325
Kurtosis	3.463538	1.634298	3.811437	2.237169	1.296192	3.983653
Jarque-Bera	59.52248	14.06485	88.78533	41.24896	30.48765	96.2288
Observations	179	179	179	179	179	179

**Table 2: OLS Results - dependent variable: log(GRADE)**

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity
C	4.517129	0.097873	46.153	0	
LOG(ATTEND)	0.537993	0.218307	2.464392	0.0148	0.537
GENDER	0.066004	0.075325	0.876255	0.3823	0.011
HYBRID	-0.23298	0.212167	-1.09807	0.2739	0.040
ONLINE	0.443126	0.234885	1.886565	0.0611	0.163
R-squared	0.245154				
Adjusted R-squared	0.22529				
Durbin-Watson	1.941651				
F-statistic	12.3414			0	

**Table 3: Censored regression results - Log(GRADE)**

Variable	Coefficient	Std. Error	z-Statistic	Prob.	Elasticity
C	4.517129	0.085857	52.61205	0	
LOG(ATTEND)	0.537993	0.078618	6.843159	0	0.537
GENDER	0.066004	0.12581	0.524636	0.5998	0.011
ONLINE	0.443126	0.132439	3.345874	0.0008	0.163
HYBRID	-0.23298	0.135073	-1.72481	0.0846	0.040
R-squared	0.245154				
Adjusted R-squared	0.220159				
Hannan-Quinn	1.978521				
SCALE:C(6)	0.611639	0.034517	17.7201	0	