Delivery versus time devoted to assignments: the effect on course performance

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ABSTRACT

Research in the area of amount of time spent on assignments and effect on course performance has focused exclusively either on the lecture or online format, but not comparison of the two. Nowhere has both modes of delivery been studied using an objective measure of course involvement. This study examines what is most significant in predicting a student's course grade: is it the method of delivery or the amount of time spent on graded assignments, and does the amount of time devoted to these assignments differ for online versus lecture presentations? The assignments were identical and tied to the textbook's online learning management system, which records the amount of time spent on assignments. This information, along with the method of delivery and eventual course grade was recorded. The student's cumulative GPA just prior to enrolling in the class was also researched in order to control for student aptitude. Two significant independent variables were found to have a positive effect upon student success: GPA and total time devoted to assignments. Students entering the course with higher GPAs earn higher grades. Furthermore, those that spend more time on assignments have better outcomes. The mode of presentation had no significant effect on performance.

Keywords: delivery, time, online, face-to-face, performance, student success

INTRODUCTION

Many studies have compared the mode of course delivery on student performance and the results have been mixed: some find online superior, others purport that nothing replaces the lecture format, and there are those that show no discernable difference between the two. However, little is known about how much actual time students devote to their studies. Anecdotal evidence tells us that students in online classes teach themselves, even when the professor has provided lectures and tutorials. Students in face-to-face courses are taught by a live instructor: they attend lectures which occur on-campus at a certain date and time. This study examines what is most significant in predicting a student's course grade: is it the method of delivery or the amount of time spent on graded assignments? This study uses data from financial management classes, one online and another taught lecture style. The assignments were identical and tied to the textbook's online learning management system, which records the amount of time spent on assignments. This information, along with the method of delivery and eventual course grade was recorded. The student's cumulative GPA just prior to enrolling in the class was also researched in order to control for student aptitude.

LITERATURE REVIEW

Research in the area of amount of time spent on assignments and effect on course performance has focused either on the lecture or online format, but not comparison of the two. Nowhere has both modes of delivery been studied using an objective measure of course involvement.

Investigations examining the amount of time devoted to assignments by students in face-to-face courses are fundamentally flawed as students usually self-report. They consistently fib about the amount of time devoted to their course work when surveyed via a questionnaire or time diary. Due to hubris, those that do well will underestimate the time devoted ("it was a piece of cake"); those that do poorly may overestimate, looking for a scapegoat, rather than their own shortcomings. On the other hand, Rich (2006) detects a positive relation between eventual course grade and effort for a finance class in which the respondents self collected the time devoted to their efforts. Nonis, Philhours, Syamil, and Hudson (2005) find that time spent on "academic activities outside of class explain a significant portion of the variation in semester GPA for seniors." Earlier research by both Didia and Hsnat (1998) and Nofsinger and Petry (1999) show an inverse relation between student self-reported effort and course outcome. Thus, there seems to be no definitive association.

However, student engagement in an online class is objectively measured by a course's learning management system. Furthermore, research by Lenz (2010) shows that students are more likely to attempt web-based homework assignments and achieve higher scores than paper and pencil homework. Johnson, Joyce and Sen (2002) gauge effort exerted on assignments "by the number of attempts and the time spent by students on computerized quizzes." Rodgers (2008) finds a positive relationship between time online and course performance, as did Coldwell, Craig, Paterson, and Mustard (2008) and Ryabov (2012). However, Davies and Graff (2005), using the amount of time devoted to online discussion boards as a measure of effort, demonstrate it is "unlikely to

automatically improve performance," as many will not become involved unless they must.

STUDY DESIGN

This study examines what is most significant in predicting a student's course grade: is it the method of delivery or the amount of time spent on graded assignments, and does the amount of time devoted to these assignments differ for online versus lecture presentations?

This examination uses data from financial management classes taught at an AACSB regional university by the same professor, using the same textbook. The lecture class is held on campus, meets twice a week for 80 minutes each over a 15- week semester, and the professor holds daily office hours. All exams are proctored in the classroom; however, homework and quizzes were completed online. While some might call this a hybrid presentation, the university where the data is collected does not; the online tools are only used to enhance and augment course content. The online presentation is defined as totally/fully online as lectures, questions and answers, homework, quizzes, and proctored exams are online. The professor and student do not meet during the 8-week course.

In terms of graded tasks, everything expected of the students is identical: same chapter homework assignments (quantitative problems) and chapter quizzes (with true-false conceptual questions). All were tied to the textbook's online learning management system, Aplia. Aplia objectively records the amount of time students spend on these assignments. Three "in-term" exams and a comprehensive final exam were proctored in both classes (with the same multiple choice questions). The time allowed for homework, quizzes, and exams was equivalent. Due dates/times were firm, even though students were encouraged to work ahead.

The study aims to control the amount of time exerted on passive learning. The ancillary materials made available by the professor were such that the amount of time the student spends in the classroom is comparable to the amount of time the online student spends with the recorded lectures and power point slides. Online students have the flexibility of listening to pre-recorded lectures at their convenience, whereas lecture students must show up at a specific place and time to listen to the live presentation (however, they are free to record lectures). While online students do not have the give and take of a live professor, they have ample opportunity to interact with the instructor and other students via email access and discussion boards. Online students must practice time management: when to listen to lectures and perform certain tasks in order to meet course requirements. Face-to-face students also practice time management, but not to the same degree: they receive active reminders in class about due dates/times for assignments and exams. Also, the syllabi of both classes contain a course calendar.

Thus, the amount of time devoted to active learning- chapter quizzes and chapter homework assignments- was used to measure time devoted to assignments. This measure was accurate as it was recorded by Aplia and not self-reported by students. Since the assignments were identical for each section, they are ideal for measuring effort on course performance, as they were structured to aid exam and course outcomes.

This information, along with the method of delivery and eventual course grade was recorded. The student's cumulative GPA prior to enrolling in the course is also included to control for student aptitude.

MODEL SPECIFICATION AND EMPIRICAL RESULTS

The model is first written as follows:

$GRADE_i = f(TIME_i, FTF/ONL_i, GPA_i,)$

where

$GRADE_i$ = grade earned by student i in course (A=4, B=3, C=2, D=1, F or W = 0)

$TIME_i$ = time spent on Aplia based homework assignments and quizzes, measured in minutes

FTF/ONL_i = mode of course delivery (1=on campus, 0=online)

GPA_i = student i's GPA prior to enrolling in course.

The data is also tested using the following model:

$PASS/FAIL_i = f(TIME_i, FTF/ONL_i, GPA_i,)$

where

$PASS/FAIL_i$ = successful completion of course by student i (A, B, C=1, D, F or W = 0)

$TIME_i$ = time spent on Aplia based homework assignments and quizzes, measured in minutes

FTF/ONL_i = mode of course delivery (1=on campus, 0=online)

GPA_i = student i's GPA prior to enrolling in course.

Successful completion of the course is defined as having earned an A, B, or C grade. Those earning a D, F or W will have to repeat the course. The results should show whether course success is dependent upon the amount of time devoted to active learning via various assignments, regardless of the mode of presentation.

Almost all of the data is collected using Aplia reports; however, the university's student database provides the necessary information for student cumulative GPA prior to course enrollment. Table 1 (Appendix) presents the descriptive statistics of the entire sample. Over the summer 2015 and fall 2015 semesters, a total of 83 students enrolled in the professor's financial management course: 36 registered for the face-to-face version, while 47 were in the online class. Based on the mean, online students devote about half the time (measured in minutes) face-to-face students spend on their assignments: 622 minutes versus 1052 minutes.

The empirical results are presented in Table 2 (Appendix). For both models, there are two significant independent variables: GPA and total time devoted to assignments. Both of these variables were found to have a positive effect upon student success. Students entering the course with higher GPAs earn higher grades. Furthermore, those that spend more time on assignments have better outcomes. The mode of presentation had no significant effect on performance, further validating the results of Russell (1999), Gange and Shepard (2001), Neuhauser (2002), and Reuter (2009).

The differential impact of time spent is introduced using interaction variables with respect to method of delivery (TIME*FTF/ONL) and GPA (TIME*GPA). Interestingly,

a negative value was found on the interaction term between TIME and GPA, suggesting that students with higher GPAs spend less time on their assignments. Alas, this effect is insignificant. When the regression includes the interaction variables, only the student's GPA is statistically significant and the model's R^2 drops.

CONCLUSION

This study confirms what professors have preached to students since the beginning of time: the more actively the student participates, the better the end result. Disciplined students devote more time to their studies and those with greater ability make better grades. However, what makes this paper different is that it considers whether the mode of delivery makes a difference. Anecdotal evidence tells us that students in online classes teach themselves in exchange for the convenience offered. Students enrolled in lecture courses must attend presentations scheduled at a specific date and time, but have the give and take of a live instructor. However, all must practice some form of time management. This study uses data from financial management classes, one online and another taught lecture style. The assignments were identical and tied to the textbook's online learning management system, which records the amount of time spent on assignments. This information, along with the method of delivery and eventual course grade was recorded. The student's cumulative GPA just prior to enrolling in the class was also researched in order to control for student aptitude. Two significant independent variables were found to have a positive effect upon student success: GPA and total time devoted to assignments. Students entering the course with higher GPAs earn higher grades. Furthermore, those that spend more time on assignments have better outcomes. The mode of presentation had no significant effect on performance. The differential impact of time spent on assignments with respect to method of delivery and GPA was statistically insignificant.

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APPENDIX

Table 1: Descriptive Statistics of Sample
Full sample, N = 83

variable	mean	standard deviation	median	mode	maximum	minimum
GRADE	1.7108	0.1460	2	3	4	0
PASS/FAIL	0.5301	0.0551	1	1	1	0
TIME	808.2169	58.7192	734	682	2830	13
FTF/ONL	0.4337	0.05473	0	0	1	0
GPA	2.8513	0.0680	2.7780	4	4	1.4620

Lecture class only, N = 36

variable	mean	standard deviation	median	mode	maximum	minimum
GRADE	2.1111	0.1943	2	3	4	0
PASS/FAIL	0.6944	0.7786	1	1	1	0
TIME	1051.8060	90.7702	976.5000	1164	2830	87
FTF/ONL	1	0	1	1	1	1
GPA	2.9158	0.1029	2.8580	2.7760	4	1.6360

Online class only, N = 47

variable	mean	standard deviation	median	mode	maximum	minimum
GRADE	1.4042	0.2010	1	0	4	0
PASS/FAIL	0.40425	0.0724	0	0	1	0
TIME	621.6383	65.6323	538	682	2023	13
FTF/ONL	0	0	0	0	0	0
GPA	2.8019	0.0908	2.7780	n/a	4	1.4620

Passing students only, N = 43

variable	mean	standard deviation	median	mode	maximum	minimum
GRADE	2.8372	0.1049	3	3	4	2
PASS/FAIL	1	0	1	1	1	1
TIME	938.9767	76.5827	887	1164	2229	87
FTF/ONL	0.5814	0.07612	1	1	1	0
GPA	3.1827	0.8339	3.2940	4	4	2.1410

Table 1, continued

Failing students only, N = 40

variable	mean	standard deviation	median	mode	maximum	minimum
GRADE	0.4474	0.08174	0	0	1	0
PASS/FAIL	0	0	0	0	0	0
TIME	647.0263	75.6325	554	682	2023	37
FTF/ONL	0.2632	0.0724	0	0	1	0
GPA	2.4849	0.0785	2.5330	n/a	3.5350	1.4620

Table 2: Regression Results of Delivery versus Time Devoted to Assignments: The Effect on Course Performance

Dependent variable: grade earned by student i in course (GRADE)

Variable	coefficient	coefficient
constant	-2.0600 (-4.1036)***	-2.6361 (-2.7642) ***
TIME	0.0008 (3.6562) ***	0.0007 (0.7260)
FTF/ONL	0.2279 (0.9815)	0.3740 (0.8538)
GPA	1.0512 (5.7890) ***	1.4384 (4.2537) ***
TIME*FTF/ONL		0.0002 (0.5170)
TIME*GPA		-0.0003 (-0.7265)
R2	0.4988	0.4206
F	26.2047***	11.1774***
N	83	83

*Note: t-statistics are in parentheses; *** denotes significance at 1%.*

Dependent variable: successful completion of course by student i (PASS/FAIL)

Variable	coefficient	coefficient
constant	-0.8119 (-4.0424) ***	-1.1458 (-3.1691) ***
TIME	0.0003 (2.8582) ***	0.0005 (1.3188)
FTF/ONL	0.1350 (1.4530)	0. 0384 (0.2310)
GPA	0.3761 (5.1771) ***	0.5513 (4.3012) ***
TIME*FTF/ONL		0.0003 (1.4119)
TIME*GPA		-0.0002 (-1.3265)
R2	0.4370	0.4157
F	20.4421***	10.9576***
N	83	83

*Note: t-statistics are in parentheses; *** denotes significance at 1%.*