A NOTE ON THE EFFICACY OF THE CANVAS LMS INDICATORS FOR STUDENT SUCCESS: EVIDENCE FROM ONLINE FINANCE AND ACCOUNTING COURSES

Michael R. Santos, Sonoma State University
Jinglin Jiang, Aidong Hu, Sonoma State University
Aidong Hu, Sonoma State University

ABSTRACT

This study utilized two quantitatively linked variables, "Total Activity" and "Page Views" on the Canvas Learning Management System (LMS), to assess their impact on student success as measured by average exam scores in online courses. "Total Activity" and "Page Views" were identified as the independent variables and average exam scores as the dependent variable. The results indicated that while "Total Activity" did not significantly affect average exam scores, "Page Views" had a statistically significant impact on average exam scores for most finance courses but not accounting courses. Additionally, the study found that the impact of these variables may be underestimated for accounting courses that utilize multiple educational LMS platforms. The study contributes to understanding how student engagement in online courses can affect academic performance.

INTRODUCTION

While there is ample published research on the determinants of a student's success from face-to-face courses, there are limited peer-reviewed research ~~papers~~ for online courses. Significantly, the prevalence of online teaching worldwide during the COVID-19 pandemic introduces more questions about what determines student success. Does it help if students spend more time online within a Learning Management System (LMS)? Do students benefit when they view more pages from within LMS? This study analyzes whether the two of the Canvas LMS indicators, Total Activity and Page Views, help assess student success which is approximated by the average exam scores.

The Canvas learning management system records "Total Activity" for each student as an approximation for study time. According to Canvas LMS (2022), the Canvas instructor guide,

*"**Total Activity [7]**—allows you to see how long students interact within a course and counts page navigation only. Total activity time is displayed in hours:minutes:seconds. If a user has not yet reached an hour of activity, total activity time is displayed as minutes:seconds. Total Activity records any time spent viewing course content that exceeds two minutes. If the time between a new activity and the last completed activity is under ten minutes, all time between these two events will also be included. Total Activity does not include group activity or page views for videos that do not include intermediate page requests."*

Also, Canvas LMS (2022), Instructure Community, explains Page Views as:

*"**Page Views**: Because the page view data is based on requests to the server, the numbers for page views may be greater than what we traditionally think of as a page view. As a result, page view data should be used as a good approximation to student activity and not an absolute metric. This data is most valuable when seeking to understand if activity did occur, and as a means of comparison across students within a course or when viewing trends week to week."*

This paper uses Total Activity measured in study hours and Page Views as the data requested from the server by the students to predict student success (the semester-end average exam scores). Currently, only one research paper has been published analyzing the effectiveness of the Total Activity measure of Canvas. Santos et al. (2021) find that Total Activity in study hours is statistically significant in explaining student success. However, there are conflicting findings from other researchers exploring the role of study time in predicting student success. For example, Calafiore & Damianov (2011) use the online tracking feature in Blackboard to analyze the impact of time spent online on their final grades and find that time spent and GPA are statistically significant determinants of the final grade.

On the other hand, Noonis and Hudson (2006) find that study time does not correlate with academic performance. Also, Noonis and Hudson (2010) investigate the relationship between study habits on college student performance and find mixed results. According to their research, the study habits, such as "access to a good set of notes" and the ability to concentrate and pay attention in class," demonstrated significant and positive relationships with the students' GPAs. However, the study habit of "scheduling regular review periods" did not show a significant relationship with GPA. Further, time at work showed significant negative correlations with the students' GPAs. Additionally, Dickinson & O'Connell (1990) find a weak correlation between the test scores and total study time. However, they found a stronger connection between test scores and time spent organizing the course content. Further, Gleason and Walstad (1988) do not support the hypothesis that student achievement is a function of study time.

Furthermore, the research on online education about student success is diverse, suggesting factors other than study time. For example, Bettinger et al. (2017) find that taking a course online reduces student success and overall progress in college by lowering grades taken online and in their future studies by making students less likely to remain enrolled at the university. Bettinger et al. compare the same course sections offered both online and in-person. In their research, the online and in-person sections use the same syllabus, the same textbook, assignments, quizzes, tests, and grading rubrics. While the in-person sections use face-to-face meetings with lecturing, class discussion, and group projects through online discussion boards,

the online sections use the professor's standardized videos in an asynchronous mode. According to Bettinger et al., "the university's online classes attempt to replicate its traditional in-person classes, except that student-student and student-professor interactions are virtual and asynchronous." Bettinger et al. data cover more than 230,000 students enrolled in 168,000 sections of more than 750 different courses from a large for-profit university with an undergraduate enrollment of more than 100,000 students at the university's 102 physical campuses. Also, Küllü and Murtagh (2019) find that early-semester TVM topic reviews using online courses improve student performance in the core finance course, especially for students with lower GPAs. Crain and Ragan (2017) examine the performance of 124 students from the online and 291 students from the face-to-face classes and find that online students perform worse than face-to-face students. Still, this difference in performance disappears when the students' completion of preparatory homework assignments variable is included. Fendler et al. (2011) examine student performance in the online and in-class instruction settings at different learning levels as classified in Bloom's taxonomy and conclude that learning outcomes differ in these two settings. They argue that the inconsistent findings about the efficacy of online versus in-person learning are due to different learning levels in the intellectual development of students. Morgan (2015) also examines online accounting programs to determine the impact of the delivery method on CPA exam passing rates and finds that online programs result in much lower pass rates.

RESEARCH METHOD AND ANALYSIS

This study uses a quantitative research method with historical data. The actual student semester-end average exam scores approximate for student success for the eight online undergraduate finance courses and six undergraduate online accounting courses from the 2019-2021 period. Canvas's Total Activity measures study time in hours, and the Page Views count the students' requests to the server.

Below, Table 1 lists the finance and accounting courses, the number of enrolled students, and indicates in which semester the courses were offered.

Table 1: Online Business Courses and the Number of Students Enrolled*

FINANCE COURSES**	COURSE NAME	# OF STUDENTS
BUS 370 FALL 2021	Introduction to Managerial Finance	75
BUS 370 SPRING 2021	Introduction to Managerial Finance	50
BUS 370 SUMMER 2019	Introduction to Managerial Finance	31
BUS 472 FALL 2021	Investments	56
BUS 473 SPRING 2021	International Finance	38
BUS 474 FALL 2021	Computer Applications in Finance	52
BUS 474 SPRING 2021	Computer Applications in Finance	39
BUS 477 WINTER 2022	Real Estate Finance	28
ACCOUNTING COURSES***	COURSE NAME	# OF STUDENTS
BUS 230A-001 FALL 2021	Financial Accounting	39
BUS 230A-001 SPRING 2021	Financial Accounting	27
BUS 230A-002 FALL 2021	Financial Accounting	37
BUS 230A-002 SPRING 2021	Financial Accounting	40
BUS 430 FALL 2021	Advanced Accounting	19
BUS 430 SPRING 2021	Advanced Accounting	25
TOTAL		556

*While the Summer (SU) online courses have four weeks of instruction, the Fall (FA) and Spring (SP) courses have a little less than 4-months of instruction.

**The finance courses have study material (practice and graded quizzes, exams and test bank, and other supplementary resources such as PowerPoint slides and Answers to Chapter-End questions embedded into the Canvas LMS system except for the course e-textbook.

***The accounting courses use McGraw-Hill's Connect, which includes all study material (practice and graded quizzes, exams, test bank, and other supplementary resources such as PowerPoint slides, Answers to Chapter-End questions) available through a link outside the Canvas LMS.

Table 2 provides the regression (OLS) results from an equation where Total Activity and Page Views are two explanatory variables for the semester-end average exam scores. Total Activity approximating study time does not have explanatory power for the eight finance and six accounting online undergraduate courses. However, Total Activity has statistical significance for one course but with a negative sign making it invalid for the analysis. On the other hand, the Page Views indicator successfully explains the dependent variable (the average semester-end exam score) in 6 out of 8 online finance courses.

According to Canvas LMS, Page Views captures "is based on requests to the server. The numbers for page views may be greater than what we traditionally think of as a page view. As a result, page view data should be used as a good approximation to student activity and not an absolute metric." Therefore, Page Views may capture student activity better when the students actively participate by clicking on digital pages on Canvas.

Page Views count the number of pages the student has visited; unfortunately, Page Views cannot provide a complete picture of a student's activity or engagement with the course material. Simply visiting a page does not necessarily mean that the student is actively participating in the course or learning the material. Therefore, to get a more accurate sense of a student's activity and

engagement, it would be helpful to consider other measures besides page views, such as the number of submissions made for assignments, participation in discussions, and assessment performance. These additional measures can give a complete picture of a student's activity and engagement with the course material.

In contrast, Total Activity is a passive and imperfect measurement of student activity by gauging how long a student stays on Canvas. While the students are on Canvas and the time for Total Activity is counting, they can use smartphones to read news, send text messages, or talk to their friends. Therefore, any measurement for study time for online courses is likely to face the same to define whether time spent online translated into learning.

Table 2: Regression between the Semester-End Average Exam Scores and Total Activity

ONLINE FINANCE COURSES	TOTAL ACTIVITY	t-STATS	PAGE VIEWS	t-STATS	# OF STUDENTS
BUS 370 FA21	-0.1037	(-0.2937)	0.0011*	(2.1386)	75
BUS 370 SP21	0.1378	(0.4068)	0.0006	(0.0005)	50
BUS 370 SU19	-0.5143	(-0.2604)	0.0005	(0.5009)	31
BUS 472 FA21	0.7242	(1.5298)	0.0025**	(3.8604)	56
BUS 473 SP21	0.0928	(0.3205)	0.0016*	(2.1079)	38
BUS 474 FA21	0.6919	(1.1379)	0.0011**	(3.5514)	52
BUS 474 SP21	-0.1654	(-0.7938)	0.0013*	(2.0867)	39
BUS 477 WI22	1.3068	(1.5815)	0.0010	(1.3735)	28
ONLINE ACCOUNTING COURSES	**TOTAL ACTIVITY**	**t-STATS**	**PAGE VIEWS**	**t-STATS**	**# OF STUDENTS**
BUS 230A-001 FA21	-1.3799	(-0.4187)	0.0080	(1.2753)	39
BUS 230A-001 SP21	4.2504	(1.6436)	0.0201	(1.9414)	27
BUS 230A-002 FA21	4.0051	(1.0812)	-0.0281*	(-2.4714)	37
BUS 230A-002 SP21	2.9818	(0.7198)	0.0098	(1.4455)	40
BUS 430 FA21	-3.3646	(-0.4940)	0.0161	(1.2208)	19
BUS 430 SP21	0.5573	(1.0234)	0.0016	0.5659	25

*Significant at 5% level.
**Significant at 1% level.

The disparity in the findings for the finance and accounting online courses could be due to having different course structures. All finance courses have study material (practice and graded quizzes, exams and test bank, and other supplementary resources such as PowerPoint slides and Answers to Chapter-End questions being embedded into the Canvas LMS system except the course e-textbook. On the other hand, the accounting courses use McGraw-Hill's Connect, which includes the study material (practice and graded quizzes, Exams, and test bank, and other supplementary resources (PowerPoint slides, Answers to Chapter-End questions) available through a link outside the Canvas LMS. Therefore, Canvas's measure for study time (Total Activity) and the number of pages clicked (Page Views) are likely to be undercounted when a student is linked to the McGraw-Hill's Connect site.

CONCLUSION AND SUGGESTIONS

The findings from a sample of online undergraduate finance and accounting courses are consistent with the view of educators that learning and teaching processes are not linear processes to be measured by some predetermined explanatory variables. Two indicators (Total Activity and Page Views) of the Canvas LMS provide limited answers to what determines student success questions.

Due to the limited or no explanatory power of Total Activity and Page Views to explain student success, future research should incorporate more quantitatively linked variables from the online LMS environments. For example, such variables could include the number of submissions made for assignments, participation in discussions, and performance on assessments.

The research findings in this paper indicate that the Total Activity measurement of Canvas LMS does not explain the semester-end average exam scores. However, the Page Views indicator is statistically significant for most finance courses but not accounting courses.

Understanding the efficacy of online teaching is challenging because the medium used through Canvas and other LMS systems provides limited and biased estimation for the student activity on the online platform. However, the challenge is similar to private corporations trying to understand whether time spent or pages clicked online at commercial websites turns into a purchase decision for the final product. For educators, it is essential to understand the student activity, whether time spent or page views on the educational LMS sites contributes to learning and retaining knowledge.

REFERENCES

Bettinger, E. P., Fox, L., Loeb, S., & Taylor, E. S. (2017). Virtual Classrooms: How Online College Courses Affect Student Success. American Economic Review, 107(9) 2855–2875.

Calafiore, P., & Damianov, D. S. (2011). The effect of time spent online on student achievement in online economics and finance courses. The Journal of Economic Education, 42(3), 209-223.

Canvas LMS. (2022). Canvas instructor guide. Retrieved from https://community.canvaslms.com/html/assets/Canvas_Instructor_Guide.pdf

Canvas LMS. (2022). Instructure Community. Retrieved from https://community.canvaslms.com/t5/New-Analytics-Users/Analytics-Page-Views-and-Participations/ta-p/262828.

Crain. S. J. & Ragan, K. P. (2017). Online Versus Face-to-Face Course Learning Effectiveness. Journal of Financial Education, 43(2), 243-261.

Dickinson, D. J., & O'Connell, D. Q. (1990). Effect of quality and quantity of study on student grades. Journal of Educational Research, 83(4), 227-231.

Fendler, R. J., Ruff, C., & Shrikhande, M. (2011). Online Versus In-class Teaching: Learning Levels Explain Student Performance. Journal of Financial Education, 37(3/4), 45-63.

Gleason, J. P., & Walstad, W. B. (1988). An empirical test of an inventory model of student study time. Journal of Economic Education, 19(4), 315- 321.

Küllü, A. M., & Murtagh, J. P. (2019). Online TVM Review and Student Performance. Journal of Financial Education, 45(2), 258-280.

Morgan, J. D. (2015). Online Versus Face-to-Face Accounting Education: A Comparison of CPA Exam Outcomes across Matched Institutions, Journal of Education for Business. 90(8), 420-426.

Noonis, S. A., & Hudson, G. I. (2006). Academic performance of college students: Influence of time spent studying and working. Journal of Education for Business, 81(3), 151-159.

Noonis, S. A., & Hudson, G. I. (2010). Performance of college students: impact of study time and study habits. Journal of Education for Business, 85, 229-238.