Student Engagement on the Learning Management System and Its Effects on Final Grades

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Background

- Flipped classroom models require students to engage with course materials outside of class time. Online learning management systems (LMS) are increasingly being used to provide a means to deliver and monitor student engagement. Blackboard® (BB) was the LMS utilized for the first-year Doctor of Pharmacy (PharmD) courses for the Classes of 2025, 2026, and 2027.
- This study considers data from multiple years of first-year PharmD students, which allows for better understanding of the trends of student engagement and performance over time.

Objective

- To investigate the effect of time pharmacy students spend reviewing course materials on a learning management system (LMS) on their final grades in Fall and Spring semesters.
- To investigate the effect of presenting student utilization data on the engagement of subsequent cohorts

Hypothesis

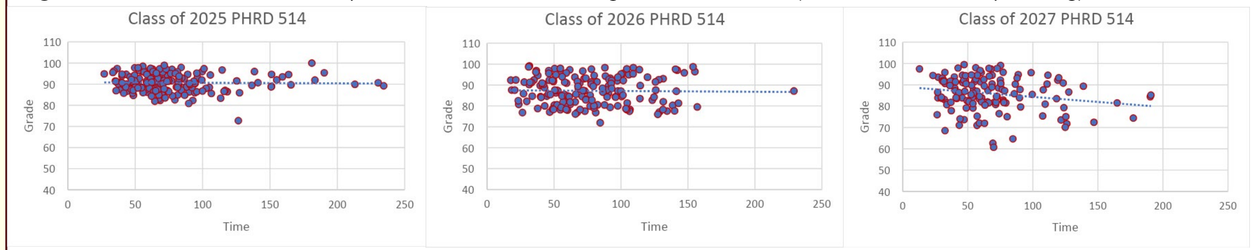
The hypothesis is that pharmacy students who spend more time on the LMS will earn higher grades overall and in each course. Additionally, the hypothesis is that students who have been presented with the LMS utilization data from previous cohorts will have a better understanding of the amount of time required to be successful in a course, which will lead to an increase in time spent on the LMS for each cohort.

Methods

- Final grades and student engagement for students in the Class of 2025 were recorded for 6 courses in the first semester and 5 courses in the second semester.
- During the orientation week prior to the start of first-year courses, student success personnel presented student utilization of the LMS data to the Class of 2026 and 2027, respectively.
- Using a regression model the effect of time spent on the LMS on the final grades of students was estimated. The lower and upper 5 percentile of class engagement and the average grades of these groups was identified. Using this data, engagement with the LMS, variability across courses, and the time needed to be successful was evaluated.

Results

Figure 1: Correlation between time spent on Blackboard and final grades for PHRD 514 (Calculations and Compounding) across 3 cohorts.



Year	2025	2026	2027	Average
R^2	0.0113	0.0045	0.0398	0.01853

Table 1: Average time (hours) engaging with material on the LMS for each course for each cohort and an average for 3 years.

	501	502	503	511	515	521	504	552	512	514	516
2025	50	23	91	102	63	24	65	84	61	78	84
2026	52	17	81	86	56	21	64	27	58	75	71
2027	48	14	68	86	51	19	49	26	56	68	65
Average	51	18	80	91	57	21	59	46	58	74	73

Table 2: Average time (hours) engaging with material on the LMS for all courses in each semester for each cohort and an average for 3 years.

	Fall	Spring
2025	58.8	74.4
2026	52.2	59.0
2027	47.7	52.8
Average	52.9	62.1

Tables 3, 4, & 5: Average time on the LMS and final grade for the lower and upper 5% of students in the Class of 2025, 2026, & 2027, respectively.

Class of 2025				
Course	Below 5%		Above 95%	
	Average Time	Average Final Grade	Average Time	Average Final Grade
501	16	62	120	99
502	6	55	58	96
503	27	61	237	108
511	41	70	226	95
515	20	58	148	100
521	7	54	67	93
504	21	67	168	105
552	33	78	187	98
512	24	83	128	99
514	35	81	188	98
516	33	78	187	98

Class of 2026				
Course	Below 5%		Above 95%	
	Average Time	Average Final Grade	Average Time	Average Final Grade
501	19	62	117	105
502	2	53	55	95
503	26	58	209	105
511	26	65	221	97
515	17	77	153	97
521	3	53	66	94
504	8	79	163	103
552	1	75	63	99
512	9	83	132	98
514	13	76	157	98
516	11	67	155	96

Class of 2027				
Course	Below 5%		Above 95%	
	Average Time	Average Final Grade	Average Time	Average Final Grade
501	15	62	90	105
502	1	65	33	99
503	21	68	137	102
511	17	54	179	94
515	15	56	109	99
521	2	55	45	98
504	16	81	110	102
552	6	80	66	103
512	22	83	126	97
514	25	67	162	98
516	30	70	141	94

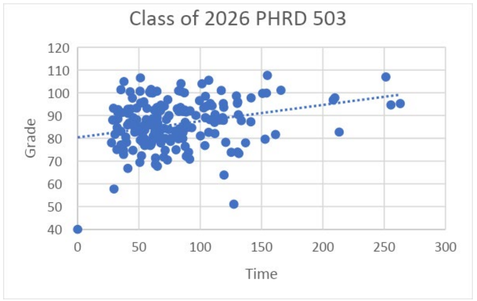


Figure 2: Time vs Grade in PHRD 503 for the Class of 2026 using a logarithmic line of best fit.

Results

- Existing data from 512 pharmacy students enrolled in the 2021-2022, 2022-2023, 2023-2024 P1 year were collected, de-identified and analyzed.
- All correlations become statistically insignificant, as seen in Figure 1 for PHRD 514 (Calculations and Compounding).
- Average intercept for the Class of 2025 is 84.81, which represents the expected average grade when study time is zero. The estimate for the effect of study time is 0.0166. This indicates that for each additional hour of study time, the expected grade increases by 0.0166 points, holding other factors constant. Thus, study time has a small but statistically significant positive effect on grades.

Discussion

- Measuring time spent on the LMS is not an accurate representation of time associated with study since it was not possible to exclude the time a student was online but not engaged in study.
- The data in this study was gathered during a period of transition from a hybrid program with more asynchronous material to one with more in-person class sessions.
- Some course series, notably the Pharmaceutics and Biological Systems courses, underwent changes relating to structure and which faculty taught the course, which may have resulted in students of that class spending less time on the LMS compared to previous years.
- This study demonstrates that each hour of study does not necessarily make a large impact on students' final grades.
- A large portion of the variability in grades remains unexplained by study time and course differences alone.
- The logarithmic nature of this data demonstrates that the first few hours of study are most impactful, and there is a point of diminishing returns after around the 100th hour of study. This data can be shared with students and can help guide conversations between student success personnel and students.
- Now, the question becomes when is the best time to deliver this information to students?

Conclusion

Having student success personnel present these data to communicate the effort required to perform successfully in a course did not result in an increase in the amount of time students were engaging with material on the LMS. This data can be insightful and helpful to guide student learning.