# Using LMS Analytics to Analyze Student Engagement and **Success: Insights from Beach XP**

# **Research Questions**

#### Topic:

This project aims to analyze the impact of Learning Technology Tools offered through the LMS on success in courses.

## Goals:

To identify what learning technology tools on Canvas contribute the most to success in first-year courses with a specific focus on Beach XP. To understand how the identified LMS tools on Canvas can be leveraged in a digital learning environment to help all students succeed.

#### **Research Questions:**

What is the ability to identify indicators of success within Canvas in select firstyear courses, including Beach XP sections, and how might analyzing and interpreting these data inform future success or challenges?

# Introduction

Digital footprints tell a powerful story. At CSULB, we're tracking how first-year students interact with Canvas to understand what drives their success.

Research shows students who actively engage with learning management systems perform better academically (Mueen et al., 2016; Bonafini et al., 2017; Zhidkikh et al., 2024)—and early intervention makes a difference (Arnold, 2010; Jayaprakash et al., 2014).

Our Beach XP program uses Canvas not just as a course platform, but as a digital community hub complementing in-person activities and providing essential support. By identifying which Canvas features most impact student outcomes, we're developing strategies to improve engagement and retention, directly supporting our Beach 2030 strategic goals:

- Engaging All Students
- Building Community
- Fostering Student Success
- Being a Student-Ready University

# Methods

## Sources of Data:

- Insight Platform Data
- Course Data from Canvas LMS
- Student Grade Records

## **Participants:**

- Students enrolled in NSCI 190A (CNSM 1st year exp course):
- $\circ$  Beach XP (N =77) Hybrid course
- $\circ$  Non-Beach XP (N = 1283) Online

## Data Analysis:

The study employed both descriptive and inferential statistical analyses, utilizing software tools such as SPSS and Microsoft Excel.

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# Results



Figure 1: Comparison of grade distributions for Beach XP (inner ring, n=77) and Non-Beach XP (outer ring, n=1283) groups. Percentages indicate the proportion within each group receiving the specified grade.

Table	Canvas Variable	Definition				
1,2,3	Assignment on time percent	Average of how many assignments were submitted on time				
1,2,3	View individual discussions	Views of specific discussion thread.				
2,3	View individual Assignments	Views of specific assignment pages by a student.				
2,3	View Course Announcements	Views of announcements posted by the instructor.				
2,3	Page as module item	Viewing specific pages/items within the course modules				
1	Modules overview	Views of the general modules overview page.				
1,2,3	Filter Discussion Replies	Actively filtering or limiting discussion replies displayed				
2,3	External module items	Accessing external resources linked within course modules.				
2,3	Course Home Page	Visits to the Main entry page. Can be set to different locations in the course. NSCI 190A is set to Course Modules				

A backward stepwise regression was performed to identify key LMS (Learning Management System) interaction metrics for a first-year Experience course for NSCI 190A on Beach XP and Non-Beach XP sections.

#### Table 1

Results of Multiple Regression Analysis for NSCI 190A Beach XP Section

			95%	6 CI		
Variable	Beta	SE	LL	UL	β	р
Assignment on Time Percent	.406	.058	.291	.521	.638	<.001 **
View Individual Discussions	396	.221	836	.044	206	.077
Modules Overview	.260	.126	.008	.512	.203	.043*
Filter Discussion Replies	.475	.274	072	1.021	.195	.088
* Significant at <.05. ** Significant at <.001						

The results of the Multiple Regression for the Beach XP sections of NSCI 190A indicate that the two key LMS engagement metrics (see Table 1) in the model displayed a significant relationship to the final Canvas course grade for Beach XP students for NSCI 190A, specifically, 59% of the variance in the finale canvas course grades could be explained by the two LMS engagement metrics listed in Table 1, R2 = .59, R = .77, F (4, 71) = 25.288, p = <.001.

• Assignment on Time Percent and Modules Overview displays a significant positive relationship with Canvas scores.

Table 2

Results of Multiple Regression Analysis for NSCI 190A Regular Section

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			95%	6 CI		
Variable	Beta	SE	LL	UL	β	р
Assignment on Time Percent	.383	.015	.353	.412	.537	<.001**
View Individual Discussions	257	.089	431	082	144	.004*
View Individual Assignments	.264	.043	.179	.349	.201	<.001**
View Course Announcements	202	.086	371	034	093	.019*
Page as Module Item	.295	.060	.178	.412	.167	<.001**
Filter Discussion Replies	.533	.070	.396	.671	.260	<.001**
External Module Items	359	.103	561	158	080	<.001**
Course Home Page	080	.039	157	003	067	.040*
* Significant at <.05. ** Signifi	cant at <.0	001				

The results of the Multiple Regression for the Non-Beach XP sections of NSCI 190A indicate that the eight LMS engagement metrics (see Table 2) in the model displayed a significant relationship to the final Canvas course grade, specifically 51% of the variance in the final Canvas course grades could be explained by the eight LMS engagement metrics listed in Table 2,  $R^2 = .51$ , R =.71, F (8, 1274) = 164.718, p = <.001.

- Assignment on Time Percent, View Individual Assignments, Page as Module Item, and Filter Discussion Replies display a significant positive relationship to a student's final Canvas score
- View Individual Discussions, View Course Announcements, External Module Items, and Course Home Page; however, display a significant negative relationship with final Canvas scores

95% CI			∕₀ CI			
Beta	SE	LL	UL	β	р	
8.920	1.661	5.661	12.179	.104	<.001 **	
.381	.015	.353	.409	.544	<.001 **	
255	.086	424	087	143	.003*	
.265	.042	.182	.347	.202	<.001 **	
195	.083	359	032	089	.019*	
.274	.057	.161	.386	.159	<.001 **	
.531	.068	.398	.664	.258	<.001 **	
319	.099	513	125	072	.001*	
078	.037	151	004	066	.038 *	
	Beta 8.920 .381 255 .265 .265 .195 .274 .531 319 078	Beta  SE    8.920  1.661    .381  .015   255  .086    .265  .042   195  .083    .274  .057    .531  .068   319  .099   078  .037	959    Beta  SE  LL    8.920  1.661  5.661    .381  .015  .353   255  .086 424    .265  .042  .182   195  .083 359    .274  .057  .161    .531  .068  .398   319  .099 513   078  .037 151	95% CIBetaSELLUL $8.920$ $1.661$ $5.661$ $12.179$ $.381$ $.015$ $.353$ $.409$ $255$ $.086$ $424$ $087$ $.265$ $.042$ $.182$ $.347$ $195$ $.083$ $359$ $032$ $.274$ $.057$ $.161$ $.386$ $.531$ $.068$ $.398$ $.664$ $319$ $.099$ $513$ $125$ $078$ $.037$ $151$ $004$	95% CIBetaSELLUL $\beta$ 8.9201.6615.66112.179.104.381.015.353.409.544255.086424087143.265.042.182.347.202195.083359032089.274.057.161.386.159.531.068.398.664.258319.099513125072078.037151004066	

To evaluate and isolate the impact of differences between courses on final Canvas grades in the multiple regression model, both courses were coded (Non-Beach XP = 0; Beach XP = 1) and incorporated into the model.

The results of the Multiple Regression indicate that the 11 LMS engagement metrics, along with the NSCI 190A Beach XP indicator (see Table 3) in the model, displayed a significant relationship to the final Canvas course grade. Specifically, 51% of the variance in the final Canvas course grades could be explained by the 11 LMS engagement metrics listed in Table 3,  $R^2$  = .51, R = .714, F (9, 1349) = 155.691, p = <.001.

NSCI 190A Beach XP Indicator (B = 8.920) was shown to have a significant positive relationship to a student's final Canvas score indicating that the Beach XP sections of the NSCI 190A course (compared to the Non-Beach XP sections) means that all else being equal, students in the Beach XP section of the NSCI 190A course tend to score (on average) 8.92 points higher on their final class score than students in the Non-Beach XP sections of the NSCI 190A Course.

- Assignment on time percent, View Individual Assignments, Page as Module Item, and Filter Discussion Replies display a significant positive relationship to a student's final Canvas score
- View Individual Discussions, View Course Announcements, External Module Item, and Course Homepage display a significant negative relationship with Canvas scores

# **Conclusion / Discussion**

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panding Collaboration and Training: The findings also support kpanding collaboration between Academic Technology Services (ATS), culty, advisors, and Beach XP program staff. Training initiatives will focus on equipping instructors and designers with evidence-based strategies to use Canvas more effectively, therefore enhancing student outcomes and enabling the collection of actionable engagement data.

# **Future Directions**





tudents in the Beach XP program demonstrated nearly 9% higher average cademic performance compared to their Non-Beach XP peers.

ubmitting assignments on time positively correlates with higher grades. ecause assignments closed at the due date, missing a deadline meant ceiving no credit. This made on time submission rates strongly predictive overall grades.

hile initial comparisons show similar grades, controlling for online ngagement in regression analysis reveals a significant positive grade npact from the Beach XP program.

negative correlation was observed between final grades and extensive viewing of discussion forums, possibly reflecting student struggles with course material or navigation.

# Implications for Action

nhancing Course Design in Canvas: Research findings highlight the sitive impact of intentional course design on student persistence. nbedding assessment-driven activities and interactive content within anvas appears to foster stronger engagement and retention. Future ourse structures will prioritize active learning and engagement through ategic use of Canvas tools, moving beyond content delivery alone.

• Strategic Program Development: At a broader level, the research will inform the strategic development of Beach XP and similar student success initiatives. By aligning digital course design with data-informed practices, CSULB can advance key institutional goals related to retention, equity, and a sense of belonging.

• Beach XP courses are being redeveloped for the 25-26 Academic Year.

• Beach XP Program staff are actively working with campus partners to create engaging content that will provide more data points. ATS Instructional Designers are building that content in Canvas taking into consideration Universal Design for Learning (UDL), accessibility, and other needs of the Beach XP program.

• Plans are being made to partner with CNSM to help redesign NSCI 190A.

• To scale research on Canvas data, additional infrastructure will need to be built. Navigating data with existing tools is difficult and limiting.