Evaluating LMS Implementation via Organisational and Community Frameworks: A Comparative Case Study of Two Norwegian Universities

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This study examines the implementation of a new learning management system (LMS), Canvas at two Norwegian universities that adopted contrasting strategies: one followed an inclusive, involvement-driven approach, while the other employed a centralized, top-down rollout. We analyse course-level Canvas data from the initial implementation year and three years post-implementation across thousands of courses at Oslo Metropolitan University (OsloMet) and the University of Stavanger (UiS). Results indicate that the participatory strategy led to uniform integration across the institution, whereas the top-down approach yielded greater variability across faculties. Over three years, both institutions achieved substantial adoption of core LMS functions, but only the inclusively implemented LMS showed uniformly high integration of organisational tools. Notably, uniform adoption of organisational features did not predict sustained interactive pedagogy. The results underscore the importance of organisational learning and faculty engagement in technology integration. Aligning LMS implementation with pedagogical support appears critical for sustaining effective use of the platform. Institutions should design implementation as a multi-stage process: securing structural coverage first, then scheduling targeted pedagogical initiatives focused on discussion design and feedback practice The study contributes to understanding how implementation strategy impacts not just adoption of technology, but also the intensity of usage and the quality of teacher-student interactions across the first three years of a platform transition.

Keywords: learning management system, community of inquiry, implementation processes, higher education, student-teacher interaction, teaching

INTRODUCTION

Learning management systems (LMS) are ubiquitous in higher education, yet their pedagogical potential often remains under-realised. In many settings instructors concentrate on basic administration and content delivery rather than sustained interaction or redesigned learning tasks (Bond et al., 2018; Simon et al., 2024). This gap between the availability of technology and its meaningful use can often be traced to how new tools are introduced and supported within institutions.

Implementation processes ranging from top-down mandates to organic, faculty-driven approaches may crucially influence the extent to which teachers adopt and integrate LMS features into teaching and learning.

Organisational learning and community perspectives help explain these differences. Structural change can mandate use, while cultural change embeds new practices through local leadership and peer modelling (Christensen et al., 2020; Mårtensson & Roxå, 2016). Communities of practice (CoP) enable collective problem solving and diffusion of concrete teaching routines, including discipline-specific exemplars of LMS use (Wenger, 1998; Beres & Janes, 2023). The Community of Inquiry (CoI) framework explains why discussion design and feedback workflows are important for learning. Social presence grows when courses support student-to-student dialogue, and teaching presence grows when instructors use the platform for timely, substantive feedback (Garrison et al., 2000).

While the SAMR model offers a useful way to articulate the advantages of technology integration, particularly its potential to move from enhancement toward transformation (Puentedura, 2013), in this case we treat it holistically, recognising that elements of substitution and redefinition often coexist within authentic practice. We refer to SAMR only as a loose heuristic for enhancement versus movement toward transformation and avoid categorical level assignments from usage counts, in line with critiques of over-interpretation (Hamilton et al., 2016). This study examines two comparable Norwegian universities that implemented Canvas with contrasting strategies. Oslo Metropolitan University adopted an involvement-based approach that mobilised super-users, having the main role in embedding new systems, training others, bridging relationships, encouraged local adaptation, and fostered cross-faculty sharing. The University of Stavanger employed a predominantly top-down rollout that prioritised central coordination and standardisation. Earlier qualitative work reported higher staff engagement under the participatory model and faster uniform deployment under the central model (Laterza et al., 2023; Johansen, 2020). The simultaneous transition creates a useful comparative setting for testing whether implementation philosophy is visible in subsequent usage patterns. Both universities transitioned to Canvas as part of a nationally coordinated procurement process that replaced their previous learning management systems which had been in place for over a decade. The simultaneous adoption of a common platform across the sector created a natural comparative opportunity, as institutions could choose their own implementation strategy while adopting the same technology.

We analysed course-level Canvas data from the implementation year and three years later to compare breadth of feature activation, intensity of use, and two indicators of interaction depth, namely normalised replies in discussions and comments per submission. The contribution is twofold. First, we provide a longitudinal, institution-wide comparison that distinguishes adoption breadth from usage intensity across core features. Second, we interpreted interaction trends through organisational learning and Community of Inquiry, treating SAMR as a cautious narrative aid rather than a measurement scheme. Specifically, the study addresses three questions: (1) How does the breadth and intensity of LMS feature adoption differ between an involvement-based and a centrally led implementation strategy over three years? (2) How do indicators of teacher-student interaction, specifically discussion reply density and feedback comment rates, develop under each strategy? (3) To what extent does uniform adoption of organisational features predict sustained interactive use of the platform? By addressing these questions, the study informs how universities can sequence technical rollouts and pedagogical supports to achieve both widespread use and sustained interaction.

METHOD

Data and filtering

We extracted anonymised, course-level data from the Canvas Data Portal for the implementation year (hereafter Year 1) and three years post-implementation (hereafter Year 3) To focus on actual teaching

activity we retained only SIS-linked courses (i.e., courses connected to the Student Information System, confirming that they were formally registered programme courses rather than test or sandbox spaces) that were published or had been published and that included at least one teacher and one student. This yielded 2,780 UiS courses and 4,342 OsloMet courses across the two waves. Faculty distributions and per wave totals appear in Table S1.

The study used anonymised, aggregated course-level data extracted from institutional Canvas Data Portal records. No individual student or teacher data were accessed or reported. Both universities authorised access to these system-level analytics for institutional research purposes. As the dataset contained no personal data and all analyses were conducted at the course level, the study did not require approval from the Norwegian Agency for Shared Services in Education and Research under applicable data protection regulations

Measures of LMS Feature Use

We tracked the following five primary Canvas features: Discussions, Assignments, Quizzes, Pages, and Modules. These features were chosen because they represent fundamental functionalities of an LMS that are pedagogically relevant across a range of uses: content organisation and delivery (Pages and Modules), asynchronous communication and collaboration (Discussions), and assessment (Assignments and Quizzes). For each course in the dataset, we determined whether the course made use of each of these features at least once during the semester. A feature was counted as "used" if there was evidence of activity (e.g. a discussion forum post, an assignment created or submitted, a quiz deployed, a page created, or a module set up) in the course logs. We then calculated the percentage of courses at each university that used each feature, providing a high-level indicator of adoption breadth. These percentages were calculated for Year 1 and Year 3, allowing comparison over time. Visualisations such as radar charts were generated to summarise the feature usage profiles of each institution (see Results). We emphasise that our primary interest was in whether a feature was adopted in a course, not the frequency of use; this binary usage rate serves as an initial gauge of adoption breadth. To examine intensity of use, we conducted additional analysis on how extensively courses employed the features. For each feature, we extracted usage frequency measures (e.g. number of discussion posts per course, number of assignments or quizzes per course, etc.). We calculated descriptive statistics (mean, median, quartiles, etc.) for these metrics at each university and time point. In order to compare patterns of intensive use across the two institutions in a meaningful way, we employed a quartile-based segmentation. We combined the course-level data from both universities to establish common benchmarks for "minimal", "moderate", and "high" usage of each feature. Specifically, for each feature we identified the first quartile (25th percentile, Q1), median (Q2), and third quartile (75th percentile, Q3) values across the combined dataset. To ensure conservative estimates, we used the lower of the two institutions' quartile values as unified thresholds. We then classified each course's usage of a given feature into one of four categories: No use, Minimal use (above Q1 but below Q2), Moderate use (between Q2 and Q3), or Frequent use (at or above Q3). This segmentation was done for Year 1 and Year 3 separately. We then aggregated these categories by institution and by faculty. Treating each faculty within a university as a unit of analysis (N = 7 faculties at UiS; N = 4 at OsloMet), we examined the proportion of courses in each usage category and how these proportions changed from Year 1 to Year 3. To statistically compare the two universities, we performed independent-samples t-tests on the number of courses exceeding each threshold (for example, comparing the number of courses with "Frequent" usage of discussions at OsloMet vs UiS). Statistical significance was evaluated at $\alpha = 0.05$ for these comparisons, and we noted in the results where differences were significant. All t-tests used Welch's correction for unequal variances. Given the small number of faculty-level units (N = 6 at UiS; N = 4 at OsloMet), we report faculty-level means, standard deviations, and raw percentage-point differences alongside t-values and exact p-values, as these are directly interpretable in context. Full test statistics appear in Table S8. The

segmentation approach provides a nuanced view of not just whether features were used, but how deeply they penetrated into the teaching practices (e.g., a high percentage of courses with frequent use of a tool indicates that the tool was not only adopted but becoming integral in many classes).

Teacher-Student Interaction Metrics

Beyond feature usage, we derived metrics to capture interactive engagement on the LMS, aligning with a pedagogical interest in how the LMS mediates communication between students and instructors. Two measures were calculated from Canvas interaction logs, chosen for their relevance to the quality of online teaching and learning:

- **Discussion contribution rate:** the number of student discussion replies per course, normalised by class size (i.e. per 100 students or per average class size). This reflects the extent of student participation in discussion forums. A higher normalised reply count suggests that the LMS is being used to facilitate peer-to-peer and student-teacher dialogue, which can be linked to social presence in an online learning environment.

- **Feedback comment rate:** the number of instructor (or peer) feedback comments on student submissions per course, normalised by the number of students and assignments. This indicates how actively instructors are using the LMS to provide feedback on student work. A greater number of comments per student submission signals a higher teaching presence and commitment to formative feedback using LMS tools (such as SpeedGrader in Canvas).

We calculated these metrics for each course in Year 1 and Year 3. Because course sizes and assignment counts vary, normalisation was important to ensure comparability. After calculating the per-course values, we averaged them at the institution level for each year. For ease of comparison, we report these interaction metrics as fold-changes from the Year 1 baseline for each university. That is, we set each metric's average value at Year 1 to 1.0 and express the Year 3 value as a multiple of the baseline. This highlights growth or decline in interaction intensity over time within each institution. Finally, we compared the two institutions' changes to see how the different implementation strategies might have influenced the evolution of online interaction.

FINDINGS

LMS Feature adoption

In the first year of Canvas adoption the two institutions showed distinct feature adoption profiles that reflected different pedagogical priorities. UiS showed higher Discussions activation than OsloMet. Discussions appeared in 71.6% of UiS courses and 39.4% of OsloMet courses. For Pages the pattern was reversed, with 34.9% at UiS and 56.8% at OsloMet. Assignments and Modules were both in a similar low to moderate range at both institutions at the beginning.
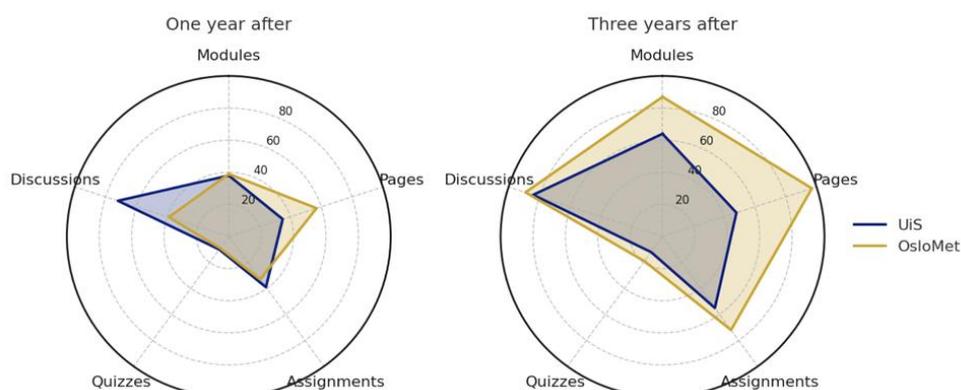
Figure 1

Comparison of Canvas feature usage one year vs. three years after implementation at the University of Stavanger (UiS, blue) and OsloMet (gold).

The radar charts plot the percentage of courses making use of each of five key features (Discussions, Assignments, Quizzes, Pages, Modules) at least once. In Year 1, the two institutions had roughly similar profiles. By Year 3, OsloMet showed increased usage across all features, while UiS saw more modest gains overall.

By the third year both increased use across all features, with a marked divergence in emphasis. OsloMet reached near-universal adoption of organisational tools, particularly Pages and Modules, indicating that Canvas had become the default environment for course structure. UiS registered smaller gains in those organisational tools but remained on par with OsloMet in the share of courses using Discussion, both having well over 80%. Assignments expanded to a clear majority of courses at both sites, with OsloMet higher than UiS. Quizzes remained the least used feature at both sites and did not exceed the 20% of courses. The uptake picture is therefore one of broad adoption by Year 3, with OsloMet strongest on organisational tools and UiS competitive on interaction.

Usage Intensity and Faculty-Level Variation

While the above adoption rates indicate whether a feature was used at all in a course, we also examined how intensively features were used, further sharpening the previous contrasts. Figure 2 summarises the distribution of courses in each usage category (None, Minimal, Moderate, Frequent) for each feature, at each university, in Year 1 and Year 3.

Each set of four stacked bars represents UiS Year 1, OsloMet Year 1, UiS Year 3, and OsloMet Year 3 (from left to right) for a given feature. Colors denote the proportion of courses with: no use (light gray), minimal use (light blue/gold), moderate use (medium blue/gold), and frequent use (dark blue/gold) of that feature. An upward arrow (#) indicates a significant increase from Year 1 to Year 3 within the same university for the highest usage category, and an asterisk (*) indicates a significant difference between OsloMet and UiS in Year 3 for the frequent-use category.

In Year 1, the distribution of usage intensity closely echoed the adoption findings. Most courses that used a given feature tended to use it at a low-to-moderate level initially. By Year 3 OsloMet shifted a larger share of courses into the moderate and frequent bands significantly for Pages and Modules and reduced no-use to a small minority across faculties. The between-institution difference in frequent use was significant for Pages, $t(5.3) = -8.27$, $p < .001$, and Modules, $t(8.0) = -6.29$, $p < .001$, with OsloMet's faculty-level means substantially exceeding those of UiS. Frequent use of Assignments was also significantly higher at OsloMet, $t(3.8) = -4.33$, $p = .014$. This means not only were more

OsloMet courses using these features at all, but many courses were using them more extensively (e.g., multiple content pages and a fully developed module structure in each course).
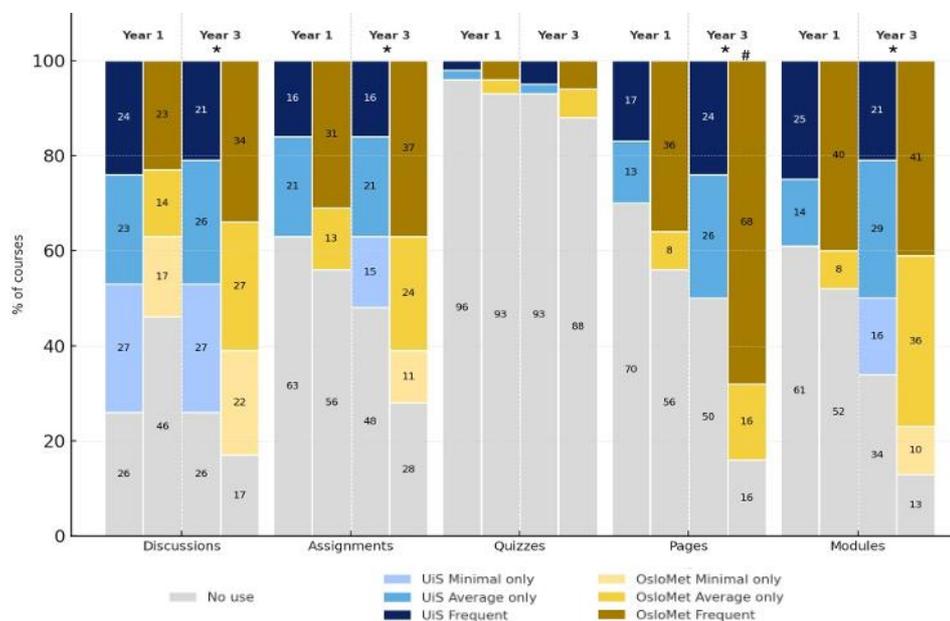

Figure 2
Distribution of course-level usage intensity for five Canvas features at UiS and OsloMet in Year 1 and Year 3.

UiS showed meaningful gains in the intensity of Discussions and Assignments in several faculties, yet overall distributions remained more uneven and between-faculty variation was larger than at OsloMet. Frequent discussion use increased significantly at both institutions from Year 1 to Year 3: UiS, $t(5) = 5.71$, $p = .002$; OsloMet, $t(3) = 4.54$, $p = .020$. Intensive use of Modules also grew significantly at both sites: UiS, $t(5) = 5.33$, $p = .003$; OsloMet, $t(3) = 6.85$, $p = .006$. Frequent use of Pages grew significantly at OsloMet, $t(3) = 5.74$, $p = .011$, and Pages adoption (at any level) grew dramatically at UiS, $t(5) = 10.46$, $p < .001$, reflecting near-universal activation by Year 3. Year-3 differences in the upper bands were most marked for organisational features, where OsloMet's moderate-plus-frequent coverage exceeded UiS. For Discussions and Assignments, UiS closed much of the gap but with higher variance across faculties. Quizzes remained the least adopted feature at both institutions throughout the study period, with no significant changes in intensive use at either site, suggesting that certain LMS functions may face cultural or pedagogical barriers that persist independent of implementation strategy.

Interactivity within Canvas

Interaction indicators diverged for discussion and converged for feedback. Discussion replies per class at UiS increased to about 1.8 times the Year 1 baseline by Year 3, while OsloMet declined to about 0.4 times its baseline. Feedback comments per student submission increased at both institutions to roughly 1.3 times their respective baselines. The combined pattern implies that UiS showed stronger dialogic activity later, whereas OsloMet's early breadth did not in itself sustain reply density without continued pedagogical reinforcement.
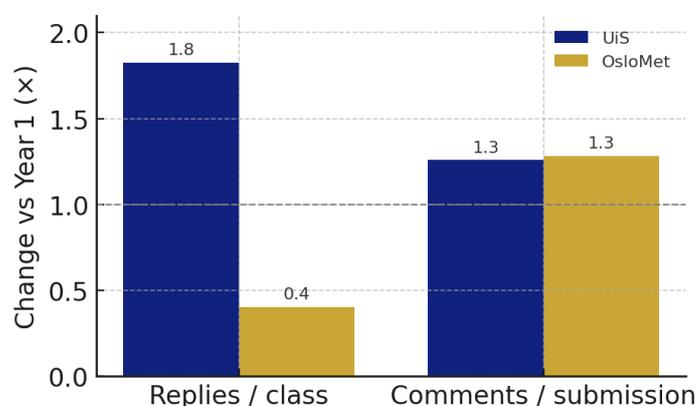
Figure 3
Growth in LMS-mediated interaction from Year 1 to Year 3 (baseline Year 1 = 1.0 for each metric).

The blue bars represent UiS and the gold bars represent OsloMet. The left pair of bars shows the fold-change in average number of student discussion replies per course (normalised for class size), and the right pair shows the fold-change in instructor feedback comments per student submission.

DISCUSSION

The comparative patterns suggest that implementation strategy shaped both the pace and the character of Canvas adoption over three years. An involvement-based approach at OsloMet prod led to highly uniform adoption across faculties by Year 3, with organisational features (Pages and Modules) embedded in most courses and usage distributions shifted toward moderate and frequent intensity. A centrally led rollout at UiS achieved initial activation in the first year but showed greater faculty-level variation in subsequent development. By Year 3, several UiS faculties had increased usage intensity substantially, while others remained at lower levels, producing a more uneven institutional profile. These contrasting trajectories are consistent with organisational learning theory that distinguishes structural change from cultural change (Hannan et al, 2003). Central mandates can establish baseline coverage. More uniform and intensive integration appears to depend on peer modelling, local ownership, and communities of practice that embed new tools into everyday teaching routines. Meaningful and sustained LMS integration occurs when teachers exercise ownership by designing, personalising, and modelling tool use, supported by peer collaboration, local decision-making, and shared instructional practices rather than institutional mandates alone (Zanjani, 2017). Integration is further reinforced when institutions align strategic intentions with local practice through shared learning and peer-led adaptation (Knowles et al., 2023).

The interaction indicators reveal a more complex picture. UiS almost doubled discussion reply density relative to its own baseline by Year 3, while OsloMet fell below its initial level. One plausible mechanism is that the broad early adoption of organisational features at OsloMet may have prioritised content delivery structures over interactive elements in subsequent refinements. This shows that an initial use or enabling of a feature does not automatically translate into sustained interactive use.

Viewed through the Community of Inquiry lens, social presence depends not only on available tools but on how courses are designed to foster student-to-student and student-teacher dialogue. Studies of online and blended learning environments similarly emphasise that students' perceptions of online learning effectiveness depend strongly on course design and interaction structures rather than the mere availability of digital platforms (Huynh & Nguyen, 2024). Recent work extending the CoI framework shows that learning presence is strongly related to the classic presences, particularly cognitive and

social presence, underscoring the model's multidimensional and interconnected nature in blended learning contexts (ElSayad, 2023).

In contrast, feedback comments per student submission increased at both institutions. This parallel growth suggests that some pedagogical practices mature relatively independently of the initial implementation strategy. Once assessment workflows, rubric tools, and feedback mechanisms such as SpeedGrader became familiar, instructors at both institutions appear to have invested more in formative written feedback. This pattern is consistent with longitudinal studies showing that certain technology practices stabilise through iterative adaptation and reflection, becoming less tied to early governance conditions over time (Wohlfart & Wagner, 2025). The feedback convergence, coupled with the discussion divergence, underscores that different features may follow different developmental trajectories even within the same institution.

This comparison suggests that implementation sequencing matters for long-term outcomes. Institutions adopting involvement-based strategies may achieve more uniform institutionalisation of organisational practices across faculties. However, uniform adoption of organisational features does not guarantee sustained interactive pedagogy. Conversely, centrally coordinated rollouts may produce initial compliance with greater variation across units, yet can achieve strong interaction outcomes if subsequent phases emphasise pedagogical development, recognising that adoption unfolds through complex interactions among the technology itself, academic staff, institutional context, and implementation strategies (Liu et al, 2020).

In both cases, the determining factor for depth of interaction is whether the institution treats pedagogical integration as continuous work rather than a one-time outcome of the technical transition. Research on learning management and student engagement similarly shows that learning activities are strongly mediated by learners' readiness and the instructional conditions that support participation, highlighting the importance of sustained pedagogical development rather than purely technical deployment (Wahyuddin et al., 2025). As studies of LMS use show, effective improvement depends on aligning technological, pedagogical, and content knowledge to inform how platforms can best support teaching and learning within specific higher education contexts (Simon et al, 2025).

The results also underscore the role of faculty-level context. At UiS, substantial differences emerged across faculties in both adoption rates and intensity distributions despite a uniform central policy. At OsloMet, distributions were markedly more even. This contrast suggests that the involvement-based approach may have built stronger cross-faculty networks and shared expectations during the implementation phase. Local leadership, disciplinary norms around assessment, and the presence of experienced super-users likely mediated what any central strategy could deliver. Institutions pursuing centrally coordinated rollouts might reduce subsequent variation by establishing faculty-level support structures and champions from the outset. Conversely, institutions using involvement-based strategies might prevent stagnation by scheduling targeted pedagogical initiatives with explicit interaction goals after the core technical adoption plateau is reached.

SAMR is useful only as a loose heuristic in this setting. By Year 3 in this comparison, both institutions had clearly moved into enhancement territory for organisational practices: course structures were digitally enabled and content delivery was streamlined. While we cannot establish if transformation has truly occurred based on feature counts alone, the increased discussion activity at UiS is consistent with movement toward more collaborative and dialogic pedagogies in some faculties, but inferring modification or redefinition from quantitative logs risks over-interpretation (Hamilton et al., 2016). We therefore use SAMR as a loose conceptual backdrop rather than a measurement framework, and interpret trajectories primarily through organisational learning and Community of Inquiry lenses, which foreground the institutional and pedagogical mechanisms that plausibly produced the observed patterns. Teaching online is not simply transferring existing lectures

and assignments into a digital format; instead, it requires substantial pedagogical redesign. Teachers must thoughtfully plan and sequence content, create activities suited for online engagement, and learn to use technological tools in ways that support learning. This demonstrates that effective online interaction does not emerge automatically from the availability of tools alone, it depends on deliberate instructional design choices that foster communication and engagement (Thorpe & Morreale, 2023). Similar observations have been reported in Norwegian higher education, where the development of shared digital learning spaces required not only technical infrastructure but also a redefinition of roles and practices between teachers and students to enable deeper forms of learning (Sailer et al., 2022).

Three practical implications emerge from this comparison. First, institutions should design LMS implementation as a multi-stage process that treats pedagogical integration as ongoing work beyond the initial technical rollout. Committing resources to a later phase focused explicitly on discussion design, feedback practices, and assessment alignment may be essential for realising the interactive potential of the platform. Second, institutions should monitor adoption using a balanced set of indicators. Tracking both the breadth of feature adoption and metrics of interaction intensity provides earlier signals of where depth is not following breadth, allowing for targeted pedagogical support. Third, local capability matters. Identifying and supporting faculty-level champions, maintaining accessible libraries of pedagogical templates, and recognising the time required for course redesign in workload planning can help sustain interaction-rich practices as administrative efficiencies are pursued.

Two important limitations temper these interpretations. First, the comparison involves only two institutions with distinct implementation approaches, which limits generalisability. The patterns observed here are suggestive but require replication across additional contexts before broad claims about implementation strategy effects can be made. Second, LMS analytics are proxies for pedagogical practice rather than direct measures of teaching quality or learning outcomes. Feature activation and interaction counts indicate what activities are enabled and how extensively they are used, but they do not reveal the quality of facilitation, the depth of feedback, or the impact on student learning. We therefore emphasise plausible mechanisms and directional patterns rather than strong causal claims. What the data do show clearly is that implementation strategy influenced the distribution and intensity of LMS use over three years, and that uniform adoption of technical features does not automatically produce uniform pedagogical engagement. This is supported by Chugh et al. (2023), who found that successful implementation of educational technologies arises from the dynamic interaction among technological features, stakeholder engagement, and post-implementation evaluation practices. Sustained attention to pedagogy, whether through involvement-based networks or through targeted post-implementation support, appears critical for translating platform capabilities into meaningful educational interactions.

CONCLUSION

The comparison in this study shows that implementation strategy shaped both the speed and the character of Canvas adoption. An involvement-based approach led to uniform integration of organisational tools across faculties by Year 3. A centrally led rollout achieved baseline activation quickly but required later, targeted initiatives to lift intensity, which translated into stronger gains in discussion activity. In parallel, both universities increased feedback comments per submission, consistent with the maturation of assessment workflows. Breadth of use did not guarantee depth of engagement. Sustained gains in dialogue depended on discipline-specific supports, concrete exemplars, and ongoing facilitation, not simply turning features on. The most effective path is sequential: secure structural coverage and basic consistency first, then schedule a second phase that focuses on discussion design and feedback practice within each discipline. Local leadership and communities of practice mediated outcomes in both settings, which means institutional policy must be matched by faculty-level capability and ownership. In practice, this requires institutions to sustain the

roles that proved effective during implementation: faculty-level super-users who bridge central policy and local practice, instructional designers who support course redesign beyond the technical transition, and programme leaders who integrate LMS expectations into curriculum planning. Where these roles were temporary or project-funded, institutions risk losing the capacity that produced the gains observed here. Monitoring a small set of indicators that capture both coverage and interaction provided a truer picture of progress than adoption alone. These conclusions are bounded by the use of platform analytics and small faculty-level samples. Even so, the comparative evidence indicates that strategy matters for what the LMS becomes in everyday teaching. Inclusive governance produced uniform consolidation of organisational practice, while central governance reached comparable outcomes in interaction when it was followed by targeted pedagogical support. In both cases, the durable gains came from deliberate work on pedagogy after the technical transition. Interpreted through the CoI lens, which conceptualises effective online learning as the interplay of social, cognitive, and teaching presence, these trajectories suggest that structural change may initiate adoption, but sustained transformation depends on how institutions cultivate interaction, reflection, and facilitation at scale. These trajectories suggest that structural change may initiate adoption, but sustained transformation depends on how institutions cultivate interaction, reflection, and facilitation at scale (Garrison et al. 2000). Future research could examine how such post-implementation phases evolve across disciplines and how institutional learning mechanisms can better integrate technical, pedagogical, and community dimensions of digital practice.

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APPENDIX A

Table S1
Number of courses on which this study is based.

University	Faculty	2018	2021
UiS			
	Faculty of science and technology (TN)	359	386
	Faculty of Social Sciences (SV)	168	192
	Division for education (DU)	41	68
	The UiS Business School (HH-UiS)	87	100
	Faculty of Health Sciences (HV)	101	132
	Faculty of Arts and Education (UH)	523	376
	Faculty of Performing Arts (UK)	121	126
	In total	1400	1380
OsloMet		2018	2021
	Faculty of Education and International Studies (LUI)	706	708
	Faculty of Technology, Art and Design (TKD)	320	388
	Faculty of Social Sciences (SAM)	401	387
	Faculty of Health Sciences (HV)	834	587
	Centre for the Study of Professions (SPS)	5	6
	In total	2266	2076

Table S2
The usage of different features in Canvas across UiS courses and all faculties in Year 1 & Year 3.

	Discussions		Assignments		Quizzes		Pages		Modules	
	Year 1	Year 3	Year 1	Year 3	Year 1	Year 3	Year 1	Year 3	Year 1	Year 3
UiS	71.6 %	83.8%	39.1 %	54.6%	10.21 %	12.2%	34.93 %	99.0%	37.71 %	64.2%
TN	79.4 %	86.0 %	40.67 %	53.1 %	10.31 %	14.8 %	27.86 %	99.0 %	33.43 %	56.2 %
SV	92.3 %	91.7 %	36.90 %	49.5 %	7.14 %	13.0 %	33.93 %	98.4 %	48.21 %	73.4 %
HH-UiS	97.7 %	97.0 %	59.77 %	60.0 %	16.09 %	16.0 %	27.59 %	98.0 %	47.13 %	69.0 %
HV	59.4 %	73.5 %	33.66 %	34.1 %	22.77 %	7.6 %	59.41 %	99.2 %	58.42 %	72.0 %
UH	61.4 %	88.6 %	36.90 %	91.2 %	10.90 %	10.6 %	42.64 %	99.5 %	36.71 %	71.3 %
UK	48.8 %	43.7 %	28.10 %	35.7 %	0.00 %	1.6 %	15.70 %	100.0 %	11.57 %	23.8 %

UiS- University of Stavanger; TN-Faculty of Science and Technology; SV-Faculty of Social Sciences; HH-UiS – The UiS Business School; HV- Faculty of Health Sciences; UH-Faculty of Arts and Education; UK- Faculty of Performing Arts.

Table S3
The usage of different features in Canvas across OsloMet courses and all faculties in Year 1 & Year 3.

	Discussions		Assignments		Quizzes		Pages		Modules	
	Year 1	Year 3	Year 1	Year 3	Year 1	Year 3	Year 1	Year 3	Year 1	Year 3
OM	39.4 %	89.4%	33.2 %	72.5%	8.6 %	18.7%	56.8 %	96.7%	38.7 %	87.3%
LUI	46.8 %	95.1 %	43.6 %	84.2 %	8.3 %	14.4 %	61.0 %	99.3 %	49.7 %	97.4 %
TKD	89.1 %	88.3 %	72.9 %	66.6 %	24.3 %	19.4 %	96.8 %	95.9 %	75.7 %	78.3 %
SAM	49.0 %	92.5 %	35.6 %	69.9 %	8.0 %	18.7 %	76.2 %	97.5 %	43.0 %	88.9 %
HV	23.7 %	82.7 %	19.8 %	66.7 %	6.7 %	23.5 %	40.8 %	95.0 %	24.5 %	83.1 %

OM- OsloMet; LUI- Faculty of Education and International Studies; TKD- Faculty of Technology, Art and Design; SAM- Faculty of Social Sciences; HV- Faculty of Health Sciences

Table S4
The percentage of UiS courses across all faculties that utilised different functions more than 10 times in the years 1 & 3.

	Discussions		Assignment		Quizzes		Pages		Modules	
	Year 1	Year 3	Year 1	Year 3	Year 1	Year 3	Year 1	Year 3	Year 1	Year 3
UiS	42.7 %	63.2 %	3.4 %	5.6 %	0.6 %	1.4 %	3.7 %	11.9 %	5.3 %	14.1 %
TN	46.0 %	62.4 %	6.1 %	7.3 %	0.8 %	0.8 %	5.6 %	15.8 %	6.1 %	15.8 %
SV	66.7 %	79.7 %	4.8 %	4.7 %	1.2 %	1.0 %	8.3 %	9.4 %	7.1 %	13.5 %

HH-UiS	60.9 %	74.0 %	4.6 %	3.0 %	2.3 %	1.0 %	4.6 %	18.0 %	5.7 %	19.0 %
HV	28.7 %	51.5 %	1.0 %	0.0 %	0.0 %	0.0 %	3.0 %	3.0 %	4.0 %	15.9 %
UH	40.0 %	68.1 %	2.1 %	6.1 %	0.4 %	0.3 %	2.1 %	10.1 %	5.7 %	13.6 %
UK	10.7 %	19.0 %	0.8 %	3.2 %	0.0 %	0.0 %	0.0 %	1.6 %	0.8 %	3.2 %

UiS- University of Stavanger; TN-Faculty of Science and Technology; SV-Faculty of Social Sciences; HH-UiS – The UiS Business School; HV- Faculty of Health Sciences; UH-Faculty of Arts and Education; UK- Faculty of Performing Arts.

Table S5

The percentage of OsloMet courses across all faculties that utilised different functions more than 10 times in the years 1 & 3.

	Discussions		Assignment		Quizzes		Pages		Modules	
	Year 1	Year 3	Year 1	Year 3	Year 1	Year 3	Year 1	Year 3	Year 1	Year 3
OM	24.8 %	74.1 %	7.4 %	17.9 %	1.1 %	3.7 %	16.0 %	51.6 %	10.2 %	30.7 %
LUI	32.7 %	82.0 %	9.6 %	19.3 %	0.9 %	1.8 %	18.9 %	49.4 %	12.3 %	31.5 %
TKD	59.5 %	73.5 %	18.0 %	19.9 %	1.4 %	2.3 %	23.6 %	44.4 %	22.2 %	32.4 %
SAM	27.3 %	75.8 %	4.5 %	8.9 %	1.5 %	2.5 %	11.9 %	47.9 %	12.4 %	34.3 %
HV	13.8 %	65.8 %	5.5 %	21.9 %	1.0 %	7.9 %	14.5 %	63.8 %	6.3 %	26.3 %

OM- OsloMet; LUI- Faculty of Education and International Studies; TKD- Faculty of Technology, Art and Design; SAM- Faculty of Social Sciences; HV- Faculty of Health Sciences

Table S6

Descriptive Statistics for canvas feature use for both universities in Year 1

Statistic	Count	Mean	Std	Min	25%	50%	75%	Max
Discussions (UiS)	1400	11.94	14.16	0	0	8	18	103
Discussions (OsloMet)	2918	10.77	18.13	0	0	1	16	215
Assignments (UiS)	1400	1.82	7.07	0	0	0	2	238
Assignments (OsloMet)	2918	3.53	8.00	0	0	0	4	153
Quizzes (UiS)	1400	0.38	3.27	0	0	0	0	91
Quizzes (OsloMet)	2918	0.56	3.50	0	0	0	0	119
Pages (UiS)	1400	1.49	3.84	0	0	0	1	43
Pages (OsloMet)	2918	7.54	16.91	0	0	0	8	250
Modules (UiS)	1400	2.19	3.81	0	0	0	3	29
Modules (OsloMet)	2918	4.37	5.98	0	0	1	7	46

Table S7

Descriptive Statistics for canvas feature use for both universities in Year 3

Statistic	Count	Mean	Std	Min	25%	50%	75%	Max
Discussions (UiS)	1380	20.38	20.10	0	5	16	30	237
Discussions (OsloMet)	1794	28.23	28.52	0	10	22	37.75	390
Assignments (UiS)	1380	2.63	4.63	0	0	1	4	45
Assignments (OsloMet)	1794	6.50	11.45	0	0	3	8	114
Quizzes (UiS)	1380	0.66	4.28	0	0	0	0	87
Quizzes (OsloMet)	1794	1.23	5.17	0	0	0	0	69
Pages (UiS)	1380	4.23	13.62	0	0	0	3	301
Pages (OsloMet)	1794	22.10	36.41	0	2	11	27	466
Modules (UiS)	1380	4.57	5.26	0	0	3	8	32
Modules (OsloMet)	1794	8.61	7.09	0	4	7	12	56

Table S8

Test statistics for between-institution (Welch's t-test) and within-institution (paired t-test) comparisons of faculty-level Canvas feature usage percentages.

Comparison	Type	UiS M (SD)	OM M (SD)	t (df)	p	Sig.
Between-institution comparisons (Year 3)						
Discussions	Adopt	80.1 (19.5)	89.6 (5.4)	−1.14 (6.1)	.297	
Assignments	Adopt	53.9 (20.8)	71.9 (8.4)	−1.89 (7.0)	.101	
Quizzes	Adopt	10.6 (5.3)	19.0 (3.7)	−2.93 (7.9)	.019	*
Pages	Adopt	99.0 (0.7)	96.9 (1.9)	2.11 (3.6)	.110	
Modules	Adopt	61.0 (19.2)	86.9 (8.2)	−2.93 (7.2)	.021	*
Discussions	>10	59.1 (21.9)	74.3 (6.7)	−1.59 (6.3)	.162	
Assignments	>10	4.0 (2.6)	17.5 (5.8)	−4.33 (3.8)	.014	*

Quizzes	>10	0.5 (0.5)	3.6 (2.9)	−2.15 (3.1)	.118	
Pages	>10	9.7 (6.6)	51.4 (8.5)	−8.27 (5.3)	<.001	***
Modules	>10	13.5 (5.4)	31.1 (3.4)	−6.29 (8.0)	<.001	***
Within-institution comparisons (Year 1 → Year 3)						
UiS (N = 6 faculties)						
Discussions	Adopt	+6.9		1.41 (5)	.218	
Assignments	Adopt	+14.6		1.77 (5)	.137	
Quizzes	Adopt	−0.6		−0.20 (5)	.853	
Pages	Adopt	+64.5		10.46 (5)	<.001	***
Modules	Adopt	+21.7		6.49 (5)	.001	**
Discussions	>10	+16.9		5.71 (5)	.002	**
Assignments	>10	+0.8		0.94 (5)	.392	
Quizzes	>10	−0.3		−1.27 (5)	.259	
Pages	>10	+5.7		2.51 (5)	.054	
Modules	>10	+8.6		5.33 (5)	.003	**
OsloMet (N = 4 faculties)						
Discussions	Adopt		+37.5	2.85 (3)	.065	
Assignments	Adopt		+28.9	2.41 (3)	.095	
Quizzes	Adopt		+7.2	1.57 (3)	.215	
Pages	Adopt		+28.2	2.39 (3)	.097	
Modules	Adopt		+38.7	3.13 (3)	.052	
Discussions	>10		+41.0	4.54 (3)	.020	*
Assignments	>10		+8.1	2.52 (3)	.086	
Quizzes	>10		+2.4	1.63 (3)	.203	
Pages	>10		+34.1	5.74 (3)	.011	*
Modules	>10		+17.8	6.85 (3)	.006	**

Note. Adopt = binary adoption rate (% of courses using the feature at least once). >10 = intensive use (% of courses using the feature more than 10 times). Between-institution tests compare faculty-level means at Year 3 (UiS N = 6 faculties; OsloMet N = 4). Within-institution tests compare matched faculty means from Year 1 to Year 3; values show mean percentage-point change. Welch's degrees of freedom are reported for between-institution comparisons.

* *p* < .05, ** *p* < .01, *** *p* < .001