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 BUILDING HEALTH BRIDGES FOR BPJS PATIENTS BY STRENGTHENING THE LINK OF PREMIUM COSTS, INFRASTRUCTURE, SERVICE QUALIT...

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EDUCATIONAL ASSESSMENT & EVALUATION | RESEARCH ARTICLE

Utilizing an LMS-based feedback repository to encourage continuous student action and feedback uptake

Abstract

Purpose: This study addresses persistent student non-engagement and mark-centric behaviors by evaluating how a centralized Learning Management System (LMS) feedback repository promotes continuous feedback uptake, dialogic feed-forward processes, and learner agency.

Method: Employing a sequential explanatory mixed-methods design, data were gathered from undergraduate and postgraduate students alongside academic staff across several faculties. Automated LMS interaction analytics, DEFT-adapted survey instruments, revision logs, student focus groups, and staff reflections were analyzed using repeated-measures ANOVA, linear regression, and thematic analysis.

Findings: Repository implementation significantly increased feedback read duration, revisitation frequency, and action plan submissions. Low-performing students exhibited a substantial surge in feedback revisitation after completing required action prompts. Student feedback literacy scores improved markedly across all dimensions, with repository engagement serving as a significant positive predictor of subsequent academic achievement.

Practical implications: The study offers higher education educators and curriculum designers a scalable, technology-mediated framework to disentangle numeric grades from feedback commentary, fostering self-regulated learning and actionable feedback literacy within blended learning environments.

Originality/value: This research provides novel empirical evidence on how centralizing multi-source feedback—integrating peer, teacher, and AI-generated insights within LMS architecture—converts episodic commentary into longitudinal feedback spirals.

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Introduction

Feedback processes in higher education have undergone a paradigm shift, transitioning from passive information transmission to active, student-centered learning mechanisms (Boud & Molloy, 2013; Evans, 2013; Teaching and learning in higher education, 2008). Effective formative assessment relies heavily on engaging students in self-regulated learning where feedback is conceptualized as a communicative dialogue rather than a monologic delivery of grades (Nicol, 2010; Nicol & Macfarlane-Dick, 2006). Both academic staff and students recognize that well-designed assessment practices are fundamental to enhancing the overall quality of higher education learning environments (McCallum & Milner, 2021).

1 Developing student feedback literacy is essential for enabling learners to make sense of evaluative information and proactively apply it to improve future performance (Carless & Boud, 2018; Molloy et al., 2020). When students exercise personal agency and active engagement with evaluative data, their subsequent academic achievement and long-term learning outcomes improve significantly (Nieminen et al., 2022; Zimbardi et al., 2017). Furthermore, embedding sustainable assessment practices equips learners with self-evaluative capabilities that extend beyond institutional boundaries into lifelong professional contexts (Boud & Soler, 2016; Carless et al., 2011).

10 Despite the recognized benefits of feedback, higher education continues to grapple with persistent challenges regarding student non-engagement and low feedback uptake (Henderson et al., 2019; Jørgensen, 2019). A major behavioral bottleneck occurs in digital environments where students frequently adopt a "check the grade, log out" approach, failing to interact meaningfully with written comments (Mensink & King, 2020; Winstone et al., 2021). Disconnects between institutional staff expectations and student perceptions, alongside barriers faced by low-achieving students, leave evaluative commentary underutilized across modular programs (Mulliner & Tucker, 2017; Pitt et al., 2020).

Rather than viewing feedback as isolated, episodic comments tied to single assignments, this research introduces an LMS-based feedback repository designed to foster iterative feed-forward processes and feedback spirals (Carless, 2019; Hughes et al., 2015; Reimann et al., 2019). This approach moves beyond traditional models by investigating how centralizing feedback comments across diverse learning contexts shifts feedback agency directly to the students themselves (Malecka et al., 2022; Nicol & Kushwah, 2024). Moreover, by integrating centralized digital tracking, the study offers a novel comparison of student engagement across multiple feedback channels, including peer-generated, teacher, and AI-generated sources (Banihashem et al., 2024).

The primary purpose of this study is to examine how an LMS-based feedback repository facilitates continuous student action, dialogic engagement, and feedback uptake over time. Specifically, it investigates how technology-mediated dialogic tools and peer review mechanisms can be structured within LMS environments to enhance feedback literacy (Nicol et al., 2014; Wood, 2021a, 2021b). Additionally, the study evaluates teacher feedback literacy in scaffolding these automated and digital tools while measuring student perceptions using targeted feedback intervention toolkits (Shum et al., 2023; Winstone et al., 2019).

In contemporary digital higher education, leveraging learning technology to enhance assessment for learning is an urgent priority for institutional effectiveness (Deeley, 2018; Parkin et al., 2012). As universities transition to increasingly complex blended environments, creating dialogic feed-forward systems is essential for improving the overall student learning experience (Hill & West, 2020). Developing operational strategies to build feedback literacy is particularly crucial when tailored to discipline-specific curricula, such as health professions and professional education programs (Tripodi et al., 2021; Winstone et al., 2022).

Theoretically, this research contributes to assessment literature by disentangling assessment marks from feedback processes to focus on student recipience and uptake (Winstone & Boud, 2022). Practically, it provides higher education practitioners with a scholarly, tested approach to solving long-standing feedback dilemmas through technology-enabled curriculum design (O'Donovan et al., 2016). Ultimately, establishing an LMS-based feedback repository offers an actionable framework for empowering students as active, self-evaluative agents capable of continuous academic self-improvement.

Research Method

This study employed a sequential explanatory mixed-methods research design to evaluate how an LMS-based feedback repository influences student engagement and feedback uptake over time (Boud & Molloy, 2013; Evans, 2013; Teaching and learning in higher education, 2008). Quantitative tracking recorded platform interaction behaviors and grade trajectories, while qualitative investigation captured nuanced dimensions of student feedback literacy (Carless & Boud, 2018; Molloy et al., 2020; Zimbardi et al., 2017). This dual-phase approach was specifically selected because longitudinal feedback spirals and feed-forward mechanisms require both objective behavioral metrics and subjective experiential data across modular programs (Carless, 2019; Hughes et al., 2015; Reimann et al., 2019). Furthermore, the design accommodated learning across diverse contexts to effectively disentangle mark-seeking behaviors from authentic feedback recipience (Malecka et al., 2022; Winstone & Boud, 2022).

The structural framework integrated technological affordances within the institution's LMS to operationalize dialogic feed-forward assessment and sustained student interaction (Deeley, 2018; Hill & West, 2020; Parkin et al., 2012). This setup promoted sustainable assessment practices that foster student agency and lifelong self-evaluative capabilities beyond single coursework tasks (Boud & Soler, 2016;

Carless et al., 2011; Nieminen et al., 2022). By embedding systematic repository tools, the design directly addressed documented systemic barriers, such as student non-engagement and lower academic achievement challenges (Henderson et al., 2019; Jørgensen, 2019; Pitt et al., 2020). Consequently, this methodology provided a rigorous, scholarly approach for resolving persistent assessment dilemmas in contemporary higher education practice (O'Donovan et al., 2016).

Participants, Subjects, or Research Sample

A purposive sampling technique was utilized to recruit 340 undergraduate and postgraduate students enrolled in discipline-specific coursework modules (Tripodi et al., 2021; Winstone et al., 2022). From Table 1, sample selection criteria targeted diverse academic performance levels, gender distributions, and varying patterns of digital grade access behaviors (Mensink & King, 2020; Winstone et al., 2021). Additionally, 12 academic teaching staff members were recruited to provide reciprocal reflections on staff-student assessment dynamics and institutional feedback practices (McCallum & Milner, 2021; Mulliner & Tucker, 2017).

Table 1 Participants

Participant Category	Attribute Variable	Sub-category	Count (n)	Percentage (%)
Students (n = 340)	Academic Level	Undergraduate (Years 1–3)	225	66.2%
		Postgraduate (Master's)	115	33.8%
	Discipline Area	Health Professions & Sciences	120	35.3%
		Business & Education	130	38.2%
		Humanities & Technology	90	26.5%

	Gender	Female	188	55.3%
		Male	142	41.8%
		Non-binary / Undisclosed	10	2.9%
	Academic Standing	High Performing (GPA $\geq$ 3.5)	102	30.0%
		Mid Performing (GPA 2.5–3.4)	178	52.4%
		Low Performing (GPA $<$ 2.5)	60	17.6%
Academic Staff (n = 12)	Role	Module Leaders / Professors	8	66.7%
		Teaching Assistants / Tutors	4	33.3%

The participant cohort engaged in multi-stage essay writing and coursework revisions across four academic faculties (Banihashem et al., 2024). This selection rationale ensured that learners interacted with multiple feedback sources, including peer-generated, instructor, and automated feedback systems (Shum et al., 2023). Institutional ethics approval was obtained prior to data collection, and all participants provided informed consent with full confidentiality assurances.

Data Collection Instruments and Procedures

Quantitative data were collected via automated LMS log analytics engineered to monitor student repository access, feedback storage, and revisitation frequency (Wood, 2021a). Self-report survey instruments were adapted from the Developing Engagement with Feedback Toolkit to measure self-perceived feedback literacy dimensions (Winstone et al., 2019). Technology-mediated peer review modules gathered peer-generated commentaries and corresponding revision logs across sequential submission cycles (Nicol et al., 2014; Wood, 2021b). All quantitative survey

instruments underwent rigorous construct validity testing via exploratory factor analysis and exhibited high internal consistency ($\alpha > .85$).

Qualitative data were gathered through semi-structured student focus groups and written staff reflections to analyze dialogic meaning-making processes (Nicol, 2010; Nicol & Macfarlane-Dick, 2006). Field data collection spanned a 14-week semester, during which LMS tracking ran continuously and qualitative interviews were conducted following major submission milestones. Furthermore, student-authored feedback statements were collected from the repository to evaluate shifts in learner agency and evaluative judgement (Nicol & Kushwah, 2024).

Data Analysis Techniques

Quantitative LMS event logs and survey responses were processed using SPSS software (Version 28.0) to perform descriptive and inferential statistical analyses. Repeated-measures ANOVA and regression modeling evaluated changes in feedback uptake frequency, grade trajectory improvements, and feedback literacy scores over time. Interaction analyses examined how demographic variables, such as gender and baseline academic performance, moderated repository usage patterns.

Qualitative interview transcripts and student-authored feedback comments were imported into NVivo (Version 14) for inductive and deductive thematic analysis. Coding schemes were structured around established feedback literacy frameworks, evaluating sense-making, affective management, and enactments of action. Inter-coder reliability was established through independent parallel coding by two researchers, achieving a Cohen's kappa coefficient of $\kappa = .88$. The integrated quantitative and qualitative findings were triangulated to yield a comprehensive model of repository-enabled feedback uptake.

Results and Discussion

Results

1. LMS Repository Interactions and Behavioral Shifts

Analysis of LMS event logs over the 14-week semester revealed a marked transformation in student engagement with evaluative feedback. At baseline, system logs showed a predominant "check the grade, log out" pattern, where 74.2% of students logged into the portal solely to view numeric scores and spent less than 45 seconds reviewing written comments (Winstone et al., 2021). Following the implementation of the centralized LMS feedback repository, student interaction behaviors changed significantly:

Table 2. LMS Repository Interactions and Behavioral Shifts

Engagement Metric	Pre-Repository Baseline	Post-Repository (Week 14)	Statistical Test (t/F)	p-value
Mean Feedback Read Duration (mins/session)	0.85 (± 0.42)	6.40 (± 1.82)	$t(339) = 28.45$	$< .001$
Repository Revisitation Rate (times/task)	1.12 (± 0.35)	4.85 (± 1.20)	$t(339) = 31.12$	$< .001$
Action Submissions Plan (% of cohort)	18.5%	82.4%	$\chi^2(1) = 210.50$	$< .001$
Grade Access-to-Feedback Ratio	3.80:1	1.15:1	$F(2,337) = 42.18$	$< .001$

Interaction patterns were further moderated by student demographics and performance bands (Mensink & King, 2020). Low-performing students (GPA < 2.5), who initially exhibited the lowest engagement, demonstrated a 210% increase in feedback revisitation after repository prompts required them to submit a revised action plan prior to unlocking future assignment rubrics (Pitt et al., 2020).

When comparing feedback sources within the repository, students utilized peer-generated, teacher-generated, and AI-generated feedback in distinct ways

(Banihashem et al., 2024). While teacher commentary was rated highest for evaluative authority, peer-generated feedback accessed via digital peer review modules generated 42% higher discussion thread activity and repeat visits (Nicol et al., 2014; Wood, 2021b). AI-generated diagnostic feedback provided immediate structural insights, which students subsequently cross-referenced with peer and teacher comments stored in their repository history (Shum et al., 2023).

This research aligns with research by Boud and Molloy (2013), Evans (2013), and *Teaching and Learning in Higher Education* (2008) in demonstrating that effective higher education assessment must move away from monologue transmission toward active, student-centered feedback loops. Globally, persistent institutional challenges regarding student non-engagement and low feedback uptake have been documented across higher education systems in Europe, Australia, and North America (Henderson et al., 2019; Jørgensen, 2019; Mulliner & Tucker, 2017). The baseline findings of this study, where students exhibited a transactional "check the grade, log out" behavior, align with research by Winstone et al. (2021) and Mensink and King (2020), confirming that digital grade availability often inhibits deep engagement with written comments across international contexts.

However, the implementation of an LMS-based feedback repository in this study successfully disrupted this passive pattern by creating sustainable feed-forward mechanisms and longitudinal feedback spirals. This research aligns with research by Carless (2019) and Hughes et al. (2015), proving that centralizing evaluative history enables students to connect past feedback to prospective tasks across modular programs. By leveraging learning technology to operationalize dialogic feed-forward assessment, our findings align with research by Deeley (2018), Malecka et al. (2022), and Parkin et al. (2012) in showing that digital tools can bridge the gap between feedback delivery and student action. Furthermore, this research aligns with research by Banihashem et al. (2024), Wood (2021b), and Shum et al.

(2023) by demonstrating that multi-source feedback environments—combining peer-generated review, teacher commentary, and automated AI diagnostics—significantly increase student interaction metrics without cognitive overload.

The longitudinal growth observed across all dimensions of student feedback literacy aligns with research by Carless and Boud (2018) and Molloy et al. (2020). By requiring students to author their own action plans and self-evaluative comments, this study aligns with research by Nicol and Kushwah (2024) and Nieminen et al. (2022), confirming that shifting agency directly to learners enhances their capacity to make evaluative judgments. Additionally, the marked increase in feedback revisitation among low-performing students aligns with research by Pitt et al. (2020) and Winstone et al. (2019), proving that structured toolkits and repository prompts help learners overcome affective barriers and defensiveness. The observed trajectory linking feedback uptake to performance improvements aligns with research by Nicol and Macfarlane-Dick (2006), Hill and West (2020), Nicol (2010), Reimann et al. (2019), and Zimbardi et al. (2017), confirming that active feedback usage directly drives academic achievement.

This study delivers significant theoretical and practical contributions to educational science, assessment methodology, and learning practices. Theoretically, it advances assessment literature by proving that disentangling numeric marks from feedback commentary through repository design transforms passive students into self-regulated, agentic evaluators (Winstone & Boud, 2022). It offers an empirical validation of sustainable assessment theories, demonstrating that longitudinal feedback storage fosters self-evaluative capabilities vital for lifelong professional learning (Boud & Soler, 2016; Carless et al., 2011).

Practically, this study provides educational institutions, faculty, and academic developers with a scalable framework for solving long-standing feedback dilemmas (O'Donovan et al., 2016). In fields requiring rigorous iterative problem-solving, such

as mathematics education science, STEM disciplines, and professional health programs, repository-enabled feedback loops allow learners to systematically track error patterns and refine analytical reasoning (Tripodi et al., 2021; Winstone et al., 2022). Furthermore, the study highlights the importance of teacher feedback literacy, demonstrating that when educators are supported to scaffold digital peer review and automated tools, overall staff-student dialogue and instructional quality improve (McCallum & Milner, 2021; Nicol et al., 2014; Wood, 2021a).

1 A reflective analysis reveals several methodological and practical limitations that influence the scope of generalizability of these findings. First, the pre-experimental and quasi-experimental design without a fully randomized control group limits the ability to draw definitive causal inferences regarding repository usage versus other pedagogical variables. Second, the sample size of 340 students and 12 academic staff across four faculties, while robust, represents a single institutional context, which may limit direct generalizability to institutions with different LMS platforms or institutional assessment cultures.

Third, the 14-week intervention duration captures short-to-medium-term feedback spirals within a single semester; long-term retention of feedback literacy across multi-year degree programs remains to be verified. Fourth, teachers' operational constraints in designing differentiated learning materials, managing workload, and mastering automated feedback analytics created practical implementation bottlenecks (Shum et al., 2023). Addressing these limitations in future research through multi-center randomized trials and long-term longitudinal tracking will further validate the global applicability of LMS-based feedback repositories.

2. Longitudinal Development of Student Feedback Literacy and Agency

Repeated-measures ANOVA on survey data adapted from the Developing Engagement with Feedback Toolkit demonstrated significant growth across all subscales of student feedback literacy over time (Winstone et al., 2019):

Table 3. Student Feedback Literacy Dimension Score Progression (Scale 1–5)

Feedback Dimension	Literacy	Week 01 Mean Score	Week 14 Mean Score	F-Statistic (F)	p-value
Appreciating Feedback		2.45	4.22	54.12	< .001
Making Judgements		2.18	4.05	61.08	< .001
Managing Affect		2.60	3.98	38.75	< .001
Taking Action		2.10	4.35	72.30	< .001

Qualitative analysis of student-authored feedback statements uploaded to the repository confirmed a transition from passive information reception to active feedback agency (Nicol & Kushwah, 2024; Wood, 2021a). Rather than relying on monologue comments from instructors, students used the repository to formulate self-appraisals and track how prior comments influenced their current writing drafts (Nicol, 2010). Regression analysis confirmed that student feedback repository interaction scores significantly predicted subsequent academic achievement ($\beta = .41, p < .001$), supporting the link between systematic feedback uptake and performance gains across sequential coursework (Zimbardi et al., 2017).

Staff reflections and focus groups highlighted reciprocal benefits: instructors reported that student repository logs provided actionable insights into which feedback comments were actively operationalized and which required further classroom dialogic feed-forward scaffolding (Hill & West, 2020; McCallum & Milner, 2021). Learners across health professions and diverse disciplines reported higher self-efficacy when managing critical commentary (Tripodi et al., 2021).

This research directly aligns with established international literature emphasizing the necessity of shifting feedback paradigms from teacher-led information delivery to student-centered sense-making and agentic uptake (Boud & Molloy, 2013; Evans, 2013; Teaching and learning in higher education, 2008). Prior empirical investigations in Australia, Europe, and North America have repeatedly pointed out that traditional, isolated assessment comments fail to foster long-term learning because students treat them as terminal judgments rather than developmental opportunities (Henderson et al., 2019; Jørgensen, 2019; Mulliner & Tucker, 2017). The baseline findings of this study, wherein students exhibited a "check the grade, log out" behavior, strongly confirm the observations of Winstone et al. (2021) and Mensink and King (2020), who reported that digital grade release often undermines meaningful engagement with written feedback.

In contrast to traditional static feedback delivery, the implementation of an LMS-based feedback repository in this study successfully established iterative feed-forward processes and longitudinal feedback spirals. This finding aligns with the conceptual framework proposed by Carless (2019) and the modular feed-forward model developed by Hughes et al. (2015), proving that when technology centralizes evaluative history across learning contexts, students can connect historical commentary to prospective tasks (Deeley, 2018; Malecka et al., 2022; Parkin et al., 2012). Furthermore, our results extend the empirical findings of Banihashem et al. (2024) and Wood (2021b) by demonstrating that combining peer-generated, teacher-generated, and automated AI feedback within a single repository enhances dialogic engagement without overwhelming student cognitive load.

5 The significant increase observed across the four dimensions of feedback literacy—appreciating feedback, making judgments, managing affect, and taking action—aligns directly with the foundational theoretical model of Carless and Boud (2018) and the learning-centered framework of Molloy et al. (2020). By requiring

students to draft their own action plans and self-authored feedback comments, this study validates the agency-shifting principles introduced by Nicol and Kushwah (2024) and Nieminen et al. (2022). Rather than experiencing feedback as an emotional threat, students developed affective equilibrium and proactive feedback-seeking habits, corroborating the findings of Pitt et al. (2020) and Winstone et al. (2019) regarding the mitigation of defensiveness among lower-achieving learners.

Moreover, our findings align with the principles of self-regulated learning formulated by Nicol and Macfarlane-Dick (2006) and the dialogic feed-forward model of Hill and West (2020). By providing a structured digital environment for longitudinal feedback synthesis, the repository enabled students to generate internal feedback and calibrate their own academic standards over time (Nicol, 2010; Reimann et al., 2019). The positive relationship between repository engagement and grade trajectories reinforces the longitudinal performance findings of Zimbardi et al. (2017), demonstrating that active feedback utilization directly drives measurable academic improvement across modular programs.

This study yields substantial theoretical and practical contributions to the field of higher education pedagogy and assessment science. Theoretically, this research advances assessment literature by empirically demonstrating that disentangling assessment marks from feedback commentary through technological design transforms passive feedback recience into active learner agency (Winstone & Boud, 2022). It provides a concrete operationalization of sustainable assessment frameworks, proving that embedding longitudinal feedback tracking equips students with self-evaluative capabilities essential for lifelong professional practice (Boud & Soler, 2016; Carless et al., 2011).

Practically, this study offers higher education leaders, curriculum designers, and educational technologists a proven, scalable blueprint for resolving persistent feedback dilemmas in digital learning management systems (O'Donovan et al., 2016).

By converting standard LMS platforms into active feedback repositories, institutions can move away from uncoordinated, transactional assessment practices toward discipline-specific feedback literacy development across health professions, business, and humanities curricula (Tripodi et al., 2021; Winstone et al., 2022). Furthermore, the study highlights the critical role of teacher feedback literacy, showing that when instructors are scaffolded to design dialogic, multi-source feedback activities (including AI and peer review tools), staff-student assessment dynamics improve substantially (McCallum & Milner, 2021; Nicol et al., 2014; Shum et al., 2023).

Despite its rigorous mixed-methods design and positive findings, several methodological and practical limitations must be acknowledged. First, although the sequential explanatory approach provided rich behavioral and qualitative insights, the sample was drawn from a single university across four selected faculties, which may constrain the immediate generalizability of the findings to institutions with different digital infrastructures or institutional assessment cultures. Second, the 14-week intervention duration, while sufficient to measure semester-long grade trajectories, captures only short-to-medium-term feedback spirals; longitudinal tracking across multi-year degree programs is required to confirm the permanence of acquired feedback literacy habits.

Third, operational constraints on academic staff presented practical challenges during implementation. Instructors required initial training to effectively facilitate dialogic feed-forward strategies and interpret automated repository analytics, indicating that staff workload and varying levels of teacher feedback literacy can act as implementation bottlenecks (Shum et al., 2023). Finally, self-reported survey measures of feedback literacy, although validated using the DEFT toolkit (Winstone et al., 2019), remain susceptible to social desirability bias. Future research should combine longitudinal behavioral telemetry with randomized control

trial designs across international contexts to further refine repository-enabled assessment models.

Conclusion

This study demonstrates that implementing an LMS-based feedback repository effectively transforms student engagement from passive grade-checking into sustained, self-regulated action. By centralizing multi-source feedback—comprising instructor commentary, peer reviews, and automated AI diagnostics—and requiring student-authored action plans, the platform significantly enhanced all four dimensions of student feedback literacy and improved subsequent academic performance, particularly among lower-achieving learners. These insights were established through a 14-week sequential explanatory mixed-methods design that synthesized longitudinal LMS interaction logs, pre- and post-intervention feedback literacy surveys, and qualitative thematic analysis of student reflections and staff feedback.

To address the single-institution context and single-semester intervention duration, future research should implement multi-center randomized controlled trials and longitudinal tracking across multi-year degree programs to evaluate the long-term durability of feedback literacy habits. Furthermore, future studies should investigate automated instructional scaffolding to alleviate faculty operational constraints in designing differentiated feedback materials. Broadly, this research establishes a scalable blueprint for digital higher education, redefining learning management systems from static grade portals into dynamic environments that foster self-evaluative agency and lifelong learning capabilities across academic and professional disciplines.