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Industry-Integrated Project-Based Learning in Construction Management: Student Reflections and Mentor Assessments as Evidence of Practice-Readiness

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Abstract

This paper assesses a project-based learning (PBL) intervention implemented in a third-year Construction Management module, which simulated pre-contract planning and contractor-subcontractor interface management through industry mentorship and authentic assessment. Students collaborated in multidisciplinary teams—including a main contractor and HVAC, electrical, and plumbing subcontractors—creating MS Project schedules and delivering oral presentations that were evaluated by external assessors. The assignment brief is being triangulated, among assessor evaluations, and consolidated student reflections to analyse learning outcomes. Feedback from assessors highlighted recurring professional challenges, including coordination inefficiencies, incomplete design information, sequencing conflicts, and the effective use of contractual mechanisms (e.g., extensions of time (EOTs), notifications of potential delays (NOPDs), and variations) alongside evidentiary records. Students reported a reinforced understanding of planning, interface management, communication, and teamwork, while also identifying constraints such as time pressures, imbalanced workload distribution, resource gaps, and the necessity for clearer assessment criteria. The results are consistent with literature on experiential learning and authentic assessment, which emphasises the importance of industry engagement, reflection, and explicit criteria in enhancing readiness for the workforce. Several refinements are suggested: phased timelines, an interface-management toolkit (including an interface register, request for information (RFI)/NOPD logs, and evidence plans), explicit rubrics, and milestone-linked mentor clinics. This study offers a replicable, industry-embedded PBL model for construction education and provides actionable design principles aimed at enhancing curriculum relevance and preparing graduates for professional practice.

Keywords

Project-Based Learning; Construction Education; Industry Mentorship; Interface Management; Authentic Assessment.

1. Introduction

Preparing construction management graduates for multi-party project environments requires more than technical knowledge. Curricula must incorporate authentic, practice-oriented tasks that build professional judgment and the capacity to manage complexity under real-world constraints. Responding to this need, the CNMN 302 module at the Durban University of Technology designed a PBL intervention in which students assumed the roles of main contractors and specialist subcontractors, engaged with industry mentors, developed MS Project construction programmes, and presented their work to external industry assessors (DUT CNMN 302 Assignment Brief, 2025; Assessors' Report, 2025). This paper evaluates the pedagogical impact of that intervention by drawing on three interrelated sources: the assignment brief, assessor observations, and student reflections. The aim is to understand what students learned, where difficulties arose, and how the design can be strengthened. This approach is consistent

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with experiential and problem-based learning methodologies, which emphasise the integration of authentic contexts and structured reflection to enhance transferability and employability (Kolb, 2014; Zhan, Boud, and Du, 2025).

1.1 Objectives

• Evaluate learning outcomes evidenced in assessor feedback and student reflections.

• Identify recurring professional themes (coordination, interface risk, evidentiary practice) and map them to curriculum aims.

• Propose design refinements (phased timelines, interface-management toolkit, mentorship scaffolding, transparent rubrics).

2. Literature Review

Experiential learning provides the theoretical foundation for project-based learning PBL through a four-stage cycle: concrete experience, reflective observation, abstract conceptualisation, and active experimentation. Research in engineering and construction education shows that this cycle produces deeper, more transferable learning when students engage with authentic tasks and engage in deliberate reflection (Kolb, 2014; McLeod, 2025; Zahraee et al., 2026). Industry mentorship strengthens this process by bridging academic and professional knowledge. Mentors help students develop the technical skills and professional judgment needed to function effectively in practice, particularly in areas such as contractual management and stakeholder communication (Rademacher & Associates, 2024; The Stuff of Success, 2024). In multi-contractor environments, effective interface management is widely acknowledged as a critical success factor. Best practices include maintaining interface registers, clearly defining roles and deliverables, establishing formal request-and-response protocols, and conducting regular coordination meetings (PMI, 2025; Ascertra, 2026; White and Marasini, 2013). In higher education, authentic assessment has evolved beyond mere task replication. Contemporary scholarship emphasises the importance of contextual and personal authenticity, student agency, and transparency of expectations. Explicit, criterion-referenced rubrics play a vital role in supporting self-assessment, aligning student expectations, and ensuring equitable evaluation (Quinlan et al., 2024; Zhan, Boud, and Du, 2025; Jonsson, 2013; Nkhoma et al., 2020). To address curriculum design implications related to interface risk, the core artefacts proposed for integrating interface management into assessment practices are therefore summarised in Table 1.

3. Methods

This study draws on document analysis across three artefact sets: (i) the CNMN 302 assignment brief, which specifies roles, deliverables, and the assessment framework; (ii) the external assessors' report, which provides group-specific professional feedback on oral presentations; and (iii) a consolidated summary of student reflections compiled from 14 groups. Thematic coding was applied to identify professional themes (coordination challenges, delay management, contractual controls, and evidentiary practices) as well as learner-centred themes such as knowledge gains, constraints encountered, and suggestions for improvement. Triangulation was then used to compare the intended curriculum logic (the assignment brief), observed professional performance (assessor themes), and perceived learning (student reflections). This approach aligns with authentic assessment evaluation strategies (Zhan, Boud, and Du, 2025). The coded insights directly informed the development of the interface-management toolkit presented in Table 1.

4. Data Collection

The primary sources included the 2025 assignment brief (PDF), an assessor's narrative report documenting feedback from oral presentations, and a consolidated summary of student feedback from 14 groups. All data were de-identified and analysed thematically (DUT CNMN 302 Assignment Brief, 2025; Assessor's Report, 2025; Consolidated Student Feedback Report, 2025). Additionally, the artefacts recommended in the interface-management toolkit (Table 1) align with the types of evidence referenced by assessors, such as RFIs, NOPDs, and rain logs.

5. Results and Discussion

5.1 Thematic Results

Assessors consistently raised a cluster of interconnected professional concerns across the 14 groups: service clashes and sequencing conflicts arising from inadequate coordination between trades; delayed or incomplete design information that disrupted programme logic; and insufficient use of formal communication channels such as RFIs and NOPDs. Assessors also noted that students rarely produced the evidentiary records (rain schedules, inspection

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photographs, and variation registers) necessary to substantiate claims for extensions of time or additional payment (Assessors' Report, 2025). These findings closely align with established interface management guidance regarding defined responsibilities, clear deliverables, and disciplined record-keeping (PMI, 2025; Ascertra, 2026). Student reflections painted a more encouraging picture of learning gains. Most groups reported improved understanding of construction sequencing, the contractor-subcontractor relationship, and the practical importance of teamwork and communication. Students also expressed genuine appreciation for the mentorship component and the realism of the task. At the same time, several recurring constraints were identified: time pressure, unequal distribution of work within teams, insufficient access to software or technical resources, and a lack of clarity regarding what was required and how performance would be judged. The literature links these issues to the value of transparent rubrics, staged task guidance, and formative feedback (Consolidated Student Feedback Report, 2025; Jonsson, 2013; Nkhoma et al., 2020). These patterns, and the mitigation strategies they suggest, are captured in the interface-management toolkit in Table 1.

While the findings of this study affirm the pedagogical value of industry-integrated PBL, it is important to acknowledge the practical challenges associated with securing and sustaining consistent industry partner involvement. Construction companies frequently operate under significant operational pressures, including tight project schedules, budget constraints, and ongoing workforce shortages, which may limit their capacity to engage meaningfully and continuously with academic institutions. Indeed, Arcoro (2026) reports that the construction industry continues to face severe workforce shortages, with the vast majority of construction firms reporting difficulty filling positions, leaving little organisational capacity to spare for academic engagement commitments. These pressures are further compounded by the project-driven and cyclical nature of construction work, where commercial priorities can shift rapidly and unpredictably.The challenge of industry disengagement is not unique to construction management education. Naseer et al. (2025) note that the depth of industry embeddedness in educational programmes varies greatly, ranging from discrete guest lectures or site visits through to high-level collaborative programme development. While studies assessing discrete industry activities report positive student perceptions around career insights and motivation gained from mentoring and profession-situated projects, skill measurement and sustained engagement remain challenging (Naseer et al. 2025). In the context of PBL specifically, collaboration challenges can often be traced to priority conflicts and uncertainty in project assignments, underscoring the need for deliberate structural safeguards (PMI 2025).

To mitigate these risks, programme coordinators should consider formalising partnership agreements that clearly define expectations, time commitments, and the mutual benefits of collaboration prior to module commencement. Ascertra (2026) suggests that best practice in industry collaboration involves establishing clear objectives, scope, and expected outcomes upfront, while fostering open communication channels and regular dialogue between partners to build trust and rapport over time. Establishing a diverse pool of industry partners, rather than relying on a small number of firms, may also buffer against disruptions caused by competing commercial priorities. Furthermore, applying a structured approach to planning, communication, and follow-up — supported by a mindset that recognises the importance of adaptability as the project develops — can help preserve the integrity of the learning experience even when partner availability fluctuates (PMI 2025).These considerations suggest that the long-term scalability of industry-integrated PBL in construction management education is contingent not only on sound pedagogical design, but also on the development of robust, institutionally supported industry engagement frameworks. Empirical evidence supports this view, with industry-enriched PBL frameworks shown to significantly increase student engagement and satisfaction, while helping to bridge the gap between academic preparation and workforce demands (Naseer et al. 2025). Future research should examine models of formalised industry-academia partnership in construction education, with particular attention to how such frameworks can be sustained across varying institutional and regional contexts

5.2 Graphical Results

This evaluation is qualitative in nature and does not include graphical figures. Future iterations of the module could usefully chart interface issues by type, frequency, and project phase to visualise recurring hotspots and track improvements across cohorts.

5.3 Proposed Improvements

Phased timeline with milestone gates: WBS → logic/dependencies → resource loading → baseline → risk/claims dossier → presentation (linked to mentor clinics).

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• Interface-management toolkit embedded in assessment: interface register, RFI log, NOPD register, evidence plan (photos, weather logs), and variance narratives.

• Transparent, criterion-referenced rubrics published early with annotated exemplars to support self- and peer-assessment.

• Targeted MS Project micro-sessions (dependencies, calendars, baselines, reporting) to raise baseline tool proficiency.

The interface-management toolkit is detailed in Table 1 for reference (see Table 1).

Table 1. Interface-Management Toolkit

Toolkit Component	**Description**
Interface Register	Tracks all interfaces, responsible parties, deliverables, and deadlines.
RFI Log	Records: Requests for Information with dates, responses, and status.
NOPD Register	Documents: Notifications of Potential Delay, and their evidentiary basis.
Evidence Plan	Defines required site photos, weather logs, and supporting documentation.

5.4 Validation

Validation in the upcoming cycle can integrate rubric-anchored scoring with pre- and post-self-efficacy measures in planning and interface management, alongside artefact analytics that compare baseline and final schedules. Comparative studies could evaluate student-sourced projects against those provided by industry within Problem-Based Learning (PBL) frameworks (ASEE PEER – PBL in BIM Education, n.d.). Future validation efforts can operationalise indicators by utilising the artefacts listed in Table 1 (for example, closure rates on Requests for Information (RFIs) and the ageing of Notices of Potential Delay (NOPDs)).

6. Conclusion

The intervention demonstrates that industry-integrated PBL can develop meaningful construction management competencies when mentor engagement, interface awareness, and assessment transparency are deliberately designed into the module. Students showed practical growth in construction sequencing, evidentiary practice, and contractual thinking, while also surfacing solvable constraints related to time management, workload equity, and assessment clarity. The proposed enhancements — phased timelines, an interface-management toolkit, structured mentorship clinics, and explicit rubrics — form a coherent and replicable framework for improving practice readiness in construction education. Institutional adoption of the toolkit artefacts presented in Table 1 can strengthen practice readiness and assessment transparency across future cohorts, and the model may serve as a useful reference for other construction and engineering programmes seeking to embed authentic, industry-connected learning.

Ethics and AI Disclosure

Ethics: This study synthesises de-identified student reflections, an assignment brief, and assessor feedback, all collected for educational purposes at the aggregate or thematic level. Individual student data is not disclosed. AI Use Disclosure: M365 Copilot was utilised for drafting, editing, and reference formatting. In short, for the internal institutional documents (DUT Assignment Brief, Assessors' Report, Consolidated Student Feedback) and some website references (Rademacher & Associates, The Stuff of Success), placeholder URLs have been used.

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Biography

Hlumela Zungu is a Lecturer in the Department of Construction Management & Quantity Surveying at the Durban University of Technology (DUT), South Africa. She holds a Master of Built Environment in Construction Management, and she is currently a PhD candidate at Nelson Mandela University. Her teaching and scholarship focus on construction management pedagogy, construction technology, and facilities management. She leads and collaborates on projects that integrate industry mentorship into student learning, with a particular interest in authentic assessment in higher education. Prior to academia, she attained a lot of experience in construction project management from different construction companies and also for the bank as an Infrastructure Manager. She engages a lot with industry partners on curriculum-aligned projects that strengthen students' transition to professional practice. She is actively involved in departmental initiatives that enhance programme relevance and student employability.

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