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A student-led living laboratory as work-integrated learning: an action research study of professional identity development in Malaysian higher education

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Abstract

Purpose – Higher education faces a growing imperative to develop graduates who possess not only academic expertise but also the resilience and practical readiness demanded by today's complex professional landscapes. While work-integrated learning (WIL) is commonly advocated to bridge this gap, most empirical studies concentrate on temporary placements, simulations or externally managed internships. Far less attention has been given to sustained, student-led ventures that present challenges of equitable access and limited student agency. In response, this study investigates an on-campus, student-led Living Laboratory at a Malaysian private university as an alternative, campus-embedded WIL model.

Design/methodology/approach – Framed by experiential learning theory, social constructivism and the Living Laboratory concept, the study employed an action research approach and a structured, iterative methodology over two semesters with 30 undergraduate business students. Participants assumed full operational responsibility for a commercial retail venture in partnership with a local pharmaceutical company. Data were collected through reflective practitioner journals, observational field notes, semi-structured focus groups and operational artefacts, and analysed using a thematic analysis framework.

Findings – Three overarching themes were identified: (1) a transition from operational anxiety to professional self-efficacy; (2) the re-contextualisation of failure as pedagogical capital; and (3) the internalisation of sustainability as a functional business constraint. These findings support the conclusion that sustained, accountable, campus-embedded enterprise fosters the development of professional identity, adaptive resilience and systems thinking.

Originality/value – The study introduces and empirically tests the Catalyst WIL Synergy Loop, a recursive five-stage framework designed to transform the university campus into a site of authentic professional praxis. The framework advances the WIL literature by providing a scalable, equity-oriented, developing-country-contextualised model that directly addresses gaps identified in the current evidence base.

Keywords Work-integrated learning, Experiential learning, Action research

Paper type Research article

Introduction

Rapid technological transformation has revolutionized the workplace, resulting in increased demand for a workforce that can adapt, think critically and apply technical knowledge in practical settings. Employers these days expect graduates to not only be academically prepared but also career-ready (Herbert *et al.*, 2020). To ensure graduates transition effectively from education to work, higher education institutions are increasingly adopting more holistic,

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career-oriented teaching approaches to bridge the gap between academic learning and industry demands. Among the varied methods, work-integrated learning (WIL) is widely endorsed as a critical mechanism for developing such capabilities (Kligyte *et al.*, 2024). Previous studies have demonstrated that different forms of WIL enhance students' perceptions of job readiness, soft skills and technical competencies (Aprile and Knight, 2020; Briant *et al.*, 2023; Ho *et al.*, 2025; Williamson *et al.*, 2020). Notwithstanding, a critical examination of prevailing WIL models, especially within the developing country contexts, reveals significant conceptual and practical limitations that this study seeks to address.

Firstly, the existing models were predominantly characterised by short-term, externally hosted placements, which present inherent limitations, such as the issues of scalability and equitable access. Particularly in developing nations, robust industry-academia networks and placement opportunities may not always present (Chand and Deshmukh, 2019). Meanwhile, even where placements exist, students were positioned as peripheral observers rather than central decision-makers. Accordingly, it is uncertain if sustained operational authority within a pedagogically structured environment influences the development of professional identity and strategic confidence among students. Secondly, the issue of equitable access is paramount (Jackson *et al.*, 2025). Traditional WIL can inadvertently privilege students with pre-existing social capital or the financial means to undertake unpaid roles, thereby exacerbating systemic inequalities (Williams *et al.*, 2025). Considering the heightened focus on equity and inclusion in higher education, an underexplored alternative is the campus-embedded WIL model, which offers a more controlled and inclusive setting for experiential learning. Consequently, there is an urgent need for empirical research on the impact of such WIL models on students' learning experience.

Thirdly, the existing WIL literature and frameworks are mainly derived from and for Western, developed-country contexts (e.g. Crawford *et al.*, 2024; English *et al.*, 2021; Jackson, 2024; Jackson and Bridgstock, 2021; Römgens *et al.*, 2020; Stahl and Wang, 2023). It is important to highlight that the socio-cultural dynamics, institutional resource profiles and graduate labour market challenges of universities in developing countries are different, thereby giving rise to the need for contextualised studies that investigate how WIL can be effectively designed and implemented in different settings. Finally, while experiential learning theory emphasises reflection and iteration, many WIL studies adopt snapshot evaluations that may potentially fail to capture the longitudinal, developmental process of learning (Motta and Galina, 2023). The emotional and cognitive journey of students as they transition from dependent learners to accountable practitioners, especially within a pedagogically structured yet authentically uncertain environment, warrants deeper inquiry.

This study addresses these gaps through an investigation of a student-led Living Laboratory at a Malaysian private university. In this initiative, the campus was reimagined as a site of authentic commerce, with a diverse cohort of undergraduates assuming full managerial responsibility for a retail venture operated in partnership with a local industry provider. The initiative was characterised by sustained engagement, genuine accountability and deliberate inclusivity. Employing an action research methodology, this paper documents the iterative development and empirical testing of a Catalyst WIL Synergy Loop across two cycles of the Living Laboratory, examining the following central question: How does participation in a campus-based, student-led enterprise influence the development of undergraduate students' professional identity and job readiness?

Literature review

Theoretical foundations and contemporary evidence on work-integrated learning

WIL is a pedagogical approach grounded in experiential learning theory put forth by Kolb (1984). In essence, the theory views learning as a continuous cycle of concrete experience, reflection, observation, abstract conceptualisation and active experimentation, arguing that teaching should move beyond academic knowledge into experience-based, practical

workplace contexts. WIL is often structured, tripartite arrangement involving learning institutions, students and external parties (e.g. industry practitioners, government, NGOs and community organisations) in providing work contexts and appropriate mentoring (Ruskin and Bilous, 2020). In the context of business education, this implies that the conventional classroom experience tends to cut short the process of learning through excessive focus on abstract conceptualization and minimal consideration of the nature of the concrete experience, which is visceral and high stakes (Obi *et al.*, 2022). By re-centring the curriculum around a "living" business entity, students may be able to engage in a dialectic tension between action and reflection, ensuring that theoretical frameworks are not merely memorized but are lived and adapted in real-time.

Empirical evidence for the efficacy of WIL is substantial. Studies demonstrate that participation in internships, placements and project-based learning improves students' perceptions of job readiness and enhances both soft skills and technical competencies (Aprile and Knight, 2020; Briant *et al.*, 2023; Ho *et al.*, 2025). Jackson and Bridgstock (2021) found that WIL participation carries significant value for graduate employment outcomes, with curricular WIL delivering the greatest benefit. Kligyte *et al.* (2024) extended this evidence base to argue for a shift toward "work-integrated professional learning", a transdisciplinary, sustained engagement that reframe the relationship between universities and industry.

Student agency, professional identity and the living laboratory

A critical complement to the experiential focus of WIL is student agency, and it can be seen as the driving force of professional change. Agency, in this context, is the ability of students to be purposeful, have influence in their surroundings, and have ownership of their career-related path (Stenalt and Lassesen, 2022; Vaughn, 2020). As claimed by Lave and Wenger (1991), true learning occurs when a student moves from the periphery of a professional community to its centre through "legitimate peripheral participation". For this transition to occur, students must be empowered to make consequential decisions within the context of real professional work.

When students exercise genuine decision-making authority, they are no longer passive consumers of a curriculum but co-producers of their own professional identities. This empowerment cultivates accountability and resilience, because feedback is no longer a grade on an assignment but the real-world performance of a business operating in a live market. The Living Laboratory concept extends this logic by embedding the enterprise within the university itself, creating what Wenger (1998) would recognise as a community of practice in which academic and professional norms intersect.

Development of the Catalyst WIL Synergy Loop

In this paper, the Catalyst WIL Synergy Loop was developed in response to these gaps as a recursive, five-stage operational framework designed to transform the university into a Living Laboratory. Unlike the original four-stage cycle of Kolb (1984), which describes the cognitive process of individual learning, the Catalyst WIL Synergy Loop is an institutional design framework specifying how a campus-based enterprise should be structured, enacted and renewed to maximise professional learning outcomes. The five stages are as follows:

(1) *Stage 1: Strategic Visioning*

Educators shift from content delivery to experience design, defining the pedagogical boundaries and institutional objectives of the laboratory by identifying how a campus-based business can meet curriculum requirements within a high-stakes experiential environment.

(2) *Stage 2: Industry Co-creation*

External industry partners co-design the operational challenges, supplying authentic products or services that students manage. This creates a community of practice put forth by Wenger (1998), in which students access professional mentorship and real market data.

(3) *Stage 3: Operational Praxis*

The locus of control shifts entirely to students, who manage the full commercial lifecycle under conditions of genuine financial accountability.

(4) *Stage 4: Reflexive Evaluation*

Drawing on the reflective observation stage of Kolb (1984), this phase moves beyond financial key performance indicators to examine students' internal development through reflective journals, focus groups and peer assessment.

(5) *Stage 5: Iterative Evolution*

Consistent with the action research spiral in Kemmis *et al.* (2014), the data and reflections gathered in Stage 4 are used to refine the pedagogical model for the next cycle, ensuring institutional sustainability and continuous innovation.

The framework differs from existing WIL models in three key respects: (1) it is campus-embedded rather than externally hosted, removing access barriers; (2) it integrates sustainability as a functional department within the enterprise rather than treating it as an ethical add-on; and (3) it operationalises industry partnership as co-design rather than sponsorship. These distinctions position the Catalyst WIL Synergy Loop as an extension and contextualisation of Kolb (1984) experiential learning theory rather than a replication of it.

The conceptual architecture of this framework is illustrated in Figure 1. Meanwhile, Table 1 provides a stage-by-stage summary of the Catalyst WIL Synergy Loop, mapping each stage to its theoretical basis and key pedagogical outputs.

Methodology

Action research design

This study adopted an action research methodology. Action research was selected because it supports simultaneous educational practice and inquiry, enabling the project team to serve the dual roles of living laboratory facilitators and researchers (Alfaro-Tanco *et al.*, 2021). The participatory character of action research allowed the team to work closely with students and

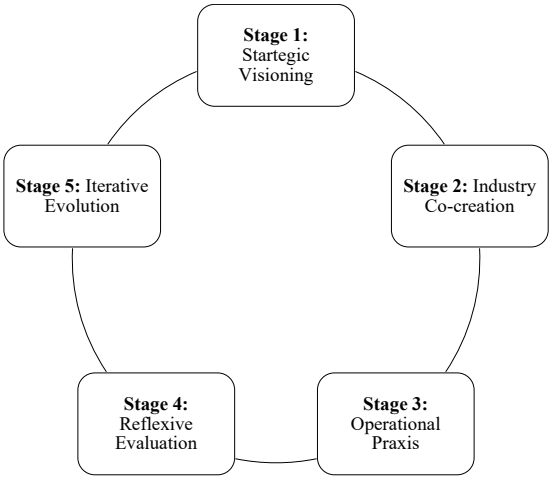

Figure 1. Conceptualised catalyst WIL synergy loop (Figure by authors)

Table 1. Catalyst WIL synergy loop: stage-by-stage summary

Stage	Name	Description	Theoretical basis	Key outputs
Stage 1	Strategic Visioning	Educators define pedagogical objectives and institutional boundaries of the laboratory	Abstract Conceptualisation (Kolb, 1984)	Pedagogical architecture; curriculum alignment
Stage 2	Industry Co-creation	External partners co-design authentic operational challenges; provide products/services and mentorship	Community of Practice; Social Constructivism (Wenger, 1998)	Industry partnership; authentic market data
Stage 3	Operational Praxis	Students assume full managerial control of the enterprise lifecycle under real financial accountability	Active Experimentation and Concrete Experience (Kolb, 1984)	Student agency; legitimate peripheral participation
Stage 4	Reflexive Evaluation	Deep qualitative reflection on professional development through journals, focus groups, and peer assessment	Reflective Observation (Kolb, 1984)	Professional identity formation; critical thinking
Stage 5	Iterative Evolution	Data-driven refinement of the pedagogical model for the next cycle using action research findings	Action Research Spiral (Kemmis *et al.*, 2014)	Institutional sustainability; continuous improvement

industry stakeholders in refining pedagogical scaffolds through iterative, real-world experimentation. The recursive Plan-Act-Observe-Reflect cycle of action research is directly compatible with the five stages of the Catalyst WIL Synergy Loop, creating a meta-learning environment in which the research process itself constitutes an instance of the pedagogical intervention under study. This approach ensures that the knowledge produced is contextualized, practice-relevant and generative for the broader WIL literature (White and Cooper, 2022).

The project team comprised two faculty members in the university's business school. Both held active roles as module convenors and simultaneously served as researcher-facilitators, consistent with the insider action research tradition (Alfaro-Tanco *et al.*, 2021). Institutional ethics approval was obtained prior to the commencement of data collection. All participants were informed of the study's purpose and their right to withdraw without academic penalty, and written consent was obtained. This study was reviewed and approved by Curtin University Human Research Ethics Committee (HREC), and the ethics review was exempted (record number EX83508).

The literature search informing the review was conducted across Scopus and Web of Science databases, using the terms: "work-integrated learning", "experiential learning", "action research", "campus-based enterprise", "professional identity" and "living laboratory", with a publication date range of 2015–2025, supplemented by seminal earlier works.

Context and industry partnership

The intervention was founded on a strategic partnership between the university's business faculty and a Malaysian-based, small-scale pharmaceutical company specialising in evidence-based skincare products. This relationship was not a conventional sponsorship arrangement. Over one semester prior to the intervention, the faculty industry liaison network facilitated introductions that led to a formal co-design agreement. Under this agreement, the company provided consignment inventory, product expertise and mentorship, while ceding operational autonomy to the student cohort. The company operated as a silent advisory partner, enabling students to confront the realities of managing a branded retail business (including real

products, financial obligations and customer relationships) within the protective structure of the campus environment.

Participant selection and team structure

The cohort comprised 30 undergraduate students enrolled in the second and third years of business programmes across four disciplines: accounting, finance, management and marketing. Recruitment was conducted through a structured expression-of-interest process. Applicants completed a three-question open-ended form addressing initiative, tolerance for ambiguity and prior enterprise experience. Responses were assessed by both faculty researchers, with selection decisions made jointly to prioritise entrepreneurial propensity over academic performance metrics. The full programme ran across two complete academic semesters, approximately 28 weeks in total.

Table 2 provides a summary of the participant profile, departmental structure and General Manager role across both semesters.

The operational structure of the Living Laboratory replicated the functional departments of a modern business organisation. Students were assigned to one of four departments: Finance and Operations (capital management, budgeting and supply chain coordination); Marketing and Branding (promotional design, market analysis, and digital and traditional campaign management); Sales and Customer Engagement (direct market interaction, point-of-sale management and qualitative customer feedback); and Sustainability and Impact (ethical oversight, waste reduction and recycling initiatives). A student General Manager (GM), selected by the project team based on assessed leadership capacity and demonstrated ability to facilitate cross-functional communication, was appointed to provide peer oversight and to serve as the primary interface between the student workforce and the faculty-researcher executive board.

The research intervention

The intervention was a multi-stage longitudinal programme spanning two academic semesters. It was treated as an additional student project (i.e. not foundational content modules), thereby mitigating the risk to students' academic performance in core disciplines. The risk was further managed through weekly scaffolding sessions in which the faculty-researchers provided structured review of operational decisions before they were implemented. Students were advised that if the commercial venture encountered insolvency risk, the industry partner's consignment model meant that financial exposure was bounded and manageable.

The intervention commenced with a Strategic Visioning workshop orienting students to the business parameters and the functional matrix. The core of the programme was the Operational

Table 2. Participant profile summary

Cohort	Student number	Year of study	Disciplines	Departmental assignment
Semester 1	15	Years 2 and 3	Accounting, Finance, Management, Marketing	Finance and Operations; Marketing and Branding; Sales and Customer Engagement; Sustainability and Impact
Semester 2	15	Years 2 and 3	Accounting, Finance, Management, Marketing	Same structure; new cohort; revised protocols from Iterative Evolution phase
GM Role	1 per semester	Year 3	Mixed	Selected by project team based on assessed leadership potential and cross-functional communication capacity

Praxis phase, during which the GM-led team assumed full responsibility for the commercial lifecycle. Unlike traditional simulations, all transactions were real – products were sold to actual customers, financial accounts were maintained and operational consequences were tangible. During this phase, the faculty-researchers adopted a scaffolding role, intervening only when challenges exceeded the students' zone of proximal development.

Data collection

A triangulation of four data sources was employed, consistent with action research methodology and criteria for qualitative rigour (Tracy, 2010; White and Cooper, 2022).

(1) *Reflective practitioner journals:* Students maintained weekly journals using a structured three-section template comprising (1) a critical incident description, (2) the decision or action taken and (3) a reflective commentary on learning and professional development. The structured format ensured consistency across participants while allowing individual voice.

(2) *Observational field notes:* Both faculty-researchers independently recorded field notes during all Living Laboratory sessions, using a common observation template focused on team dynamics, GM leadership effectiveness and strategy adaptation. Notes were compared and reconciled weekly to identify convergent and divergent patterns.

(3) *Semi-structured focus groups:* At the conclusion of the Reflexive Evaluation stage in each semester, focus group interviews were conducted with volunteer sub-groups of eight to ten students. Sessions were audio-recorded, transcribed verbatim and facilitated by one researcher not directly involved in the day-to-day operations, to reduce social desirability bias.

(4) *Operational artefacts:* Business reports, marketing collateral and financial statements produced by students were collected as naturally occurring secondary evidence. Their quality and accuracy were evaluated against established course assessment rubrics by an independent assessor to ensure consistency of judgement.

Table 3 provides a summary of data sources, collection methods, and their alignment to the Catalyst WIL Synergy Loop stages. Importantly, the data collection was designed to achieve triangulation across source type (participant self-report, researcher observation and document analysis) and time point (weekly and end-of-semester), which is consistent with criteria for qualitative trustworthiness in Lincoln and Guba (1985).

Table 3. Data triangulation matrix

Data source	Collection method	Timing	Synergy loop stage
Reflective Practitioner Journals	Structured 3-section weekly template (critical incident; action taken; reflective commentary)	Weekly throughout both semesters	Stages 3 & 4: Operational Praxis; Reflexive Evaluation
Observational Field Notes	Dual-researcher independent observation using shared template; notes reconciled weekly	Each Living Laboratory session	Stage 3: Operational Praxis
Semi-Structured Focus Groups	Audio-recorded; verbatim transcription; facilitated by researcher not in day-to-day operations	End of each semester (2 cycles)	Stage 4: Reflexive Evaluation
Operational Artefacts	Document collection (reports, financial statements, marketing collateral); quality assessed against course rubric by independent assessor	End of each semester	Stage 5: Iterative Evolution

Data analysis

Data analysis followed the six-phase thematic analysis framework of Braun and Clarke (2006). Consistent with the action research design, analysis was an ongoing process rather than a post-hoc activity, with emerging findings directly informing the Iterative Evolution stage of each cycle.

In Phase 1 (familiarisation), focus group transcripts and journal entries were read repeatedly by both researchers. In Phase 2 (initial coding), open coding generated a broad set of initial codes, including pre-participation anxiety, conflict resolution strategies, budget error responses and ethical dissonance episodes, directly from the data. In Phase 3 (theme searching), codes were clustered into potential themes using axial coding, with particular attention to patterns in which student agency was associated with increased professional confidence. In Phase 4 (theme review), the draft themes were tested against the full data set to ensure adequacy and distinctiveness. Phase 5 (defining and naming themes) produced the three final themes presented in the Findings section. Phase 6 (reporting) involved synthesising the themes into the coherent narrative below.

Member-checking was employed as a credibility measure: preliminary thematic findings were shared with the student GM and all four department heads, who confirmed the interpretations as consistent with their experiences. Disconfirming evidence was actively sought; one instance is discussed in Theme 1.

Table 4 provides a summary of the thematic analysis, mapping representative open codes and axial categories to the three overarching themes.

Findings

The implementation of the Living Laboratory, structured through the Catalyst WIL Synergy Loop, generated a rich qualitative dataset. Thematic analysis identified three overarching themes reflecting the transformative professional learning process experienced by participants. The discussion below presents each theme supported by verbatim participant data, consistent with qualitative research standards (Tracy, 2010).

Theme 1: From operational anxiety to professional efficacy

The initial phase of the intervention was characterised by acute operational anxiety. Unlike conventional business simulations, the presence of real-world stakes (i.e. actual products, live financial obligations and direct customer interactions) created a form of cognitive friction that challenged participants' existing academic self-schemas. Journal entries from the first four weeks were dominated by expressions of uncertainty and self-doubt:

Table 4. Thematic analysis summary: open codes, axial categories and overarching themes

Representative open codes	Axial category	Overarching theme
Pre-participation anxiety; role confusion; self-doubt; overwhelm in Weeks 1–3	Anxiety–Efficacy Transition	Theme 1: From Operational Anxiety to Professional Efficacy
Decision confidence growth; managerial identity; "acting like a professional"	Professional Self-Concept Development	Theme 1: From Operational Anxiety to Professional Efficacy
Budget errors; stock-out events; failed marketing campaigns; emotional distress	Productive Failure Episodes	Theme 2: Re-contextualising Failure as Pedagogical Capital
Post-failure analysis; revised operational strategy; "the lesson was permanent"	Iterative Learning from Failure	Theme 2: Re-contextualising Failure as Pedagogical Capital
Sustainability as "buzzword"; compliance mindset; ethical obligation framing	Initial Sustainability Framing	Theme 3: Sustainability as Functional Constraint
Cost–benefit reconciliation of eco-practices; ethics integrated into operations	Sustainability Internalisation	Theme 3: Sustainability as Functional Constraint

> I didn't realise how different it would feel to be responsible for something that could actually go wrong. In class, a wrong answer is just a mark. Here, a wrong decision means we lose money. (Finance Department, Week 3, Reflective Journal)

This early anxiety was not universal, however. A small number of students, particularly those with prior enterprise experience, reported lower initial anxiety and adapted to the operational role more rapidly. This disconfirming pattern suggests that prior exposure to risk-bearing contexts moderates the anxiety response, a finding consistent with social cognitive theory of self-efficacy (Bandura, 1997).

As the Operational Praxis phase progressed, however, the dominant trajectory was one of growing professional confidence. Focus group data from the end of Semester 1 revealed a consistent shift in self-concept:

> At first I was just doing tasks. By the end, I was making decisions. The textbook gives you the theory, but the lab gives you the instinct. (Marketing Department, Semester 1 Focus Group)

The student GM structure played a critical role in mediating this transition. By navigating departmental conflicts and live deadlines, the GM moved from "student of management" to "acting manager", with direct consequences for team performance. This aligns with Lave and Wenger (1991) concept of legitimate peripheral participation, i.e. agency was not simulated but enacted under genuine conditions.

Theme 2: Re-contextualising failure as pedagogical capital

A second significant finding was the role of productive failure in the learning process. In the conventional assessment model, failure is penalised as a final grade. Within the Living Laboratory, failure was systematically re-contextualised as a diagnostic instrument for iterative improvement.

Observational field notes recorded multiple instances of failure during the Operational Praxis phase – marketing campaigns that did not generate expected sales volumes, supply chain disruptions due to under-forecasting and one significant budget error that prevented timely restocking of the venture's best-selling product. Rather than concealing or minimising these events, students subjected them to rigorous analysis during the Reflexive Evaluation sessions. The head of the Finance Department wrote:

> In a case study, a budget error is a red mark. Here, a budget error meant we couldn't restock our best-selling item. The stress was real, but the lesson was permanent. (Finance Department Head, Semester 2 Reflective Journal)

This account is consistent with Motta and Galina's (2023) findings on experiential learning in entrepreneurship education, which identified failure analysis as a key mechanism through which abstract knowledge is converted into durable professional wisdom. The action research spiral institutionalised this process – each failure became the "raw material" for the next cycle of the Synergy Loop, transforming setbacks into structural improvements in the laboratory's operating procedures.

Theme 3: transitioning sustainability from concept to functional constraint

Prior to the intervention, focus group data indicated that participants held a largely instrumental view of sustainability, treating it as a corporate compliance obligation or a peripheral ethical concern. The embedding of a dedicated Sustainability and Impact department within the core functional matrix of the enterprise disrupted this framing.

When students assumed direct responsibility for managing waste reduction and recycling as operational functions, sustainability shifted from a theoretical ideal to a functional constraint that had to be reconciled with the imperatives of profitability and operational efficiency:

> I used to think sustainability was just something companies put in their annual report. Now I know it costs money and saves money at the same time. You have to plan for it from the start. (Sustainability Department Head, Semester 2 Focus Group)

By the Iterative Evolution phase of Semester 2, the Sustainability team had developed a waste reduction protocol that was voluntarily adopted by the Finance and Operations department as a cost-saving measure. This integration reflects what the study terms the emergence of a Sustainable Professional Identity, i.e. an orientation in which ethical decision-making becomes an inseparable component of operational competence, consistent with the aspirations of SDG 12 (Responsible Consumption and Production).

Discussion

The Living Laboratory as a "third space"

A primary theoretical contribution of this study is the identification of the campus-based Living Laboratory as a "third space" in professional education – a liminal zone that exists between the theoretical safety of the classroom and the hierarchical pressure of an external corporate internship. Drawing on the concept of the third space by Bhabha (1994) and its application in educational contexts, this study argues that the Living Laboratory constitutes a hybrid environment in which the boundaries between "student" and "professional" are productively blurred. Traditional WIL frequently places students in a binary environment: they are either observers of theory in the classroom or guests in a workplace with constrained agency. The Living Laboratory resolves this binary by creating a space in which student agency is both necessary and consequential.

This conceptualization of the Living Laboratory as a third space is illustrated in Figure 2.

This aligns with Wenger's (1998) theory of communities of practice. By appointing a GM and organising the cohort into functional departments, the intervention created a social structure in which legitimate peripheral participation was genuinely enacted. The progression from operational anxiety to professional confidence documented in Theme 1 confirms that

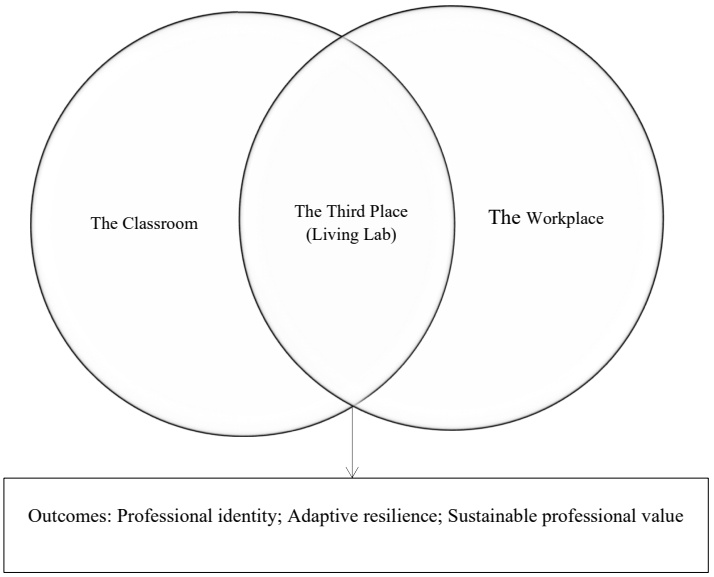

Figure 2. The living laboratory as a third space for professional learning (Figure by authors)

when students are given meaningful operational authority, they begin to inhabit, rather than merely perform, a professional persona.

Anxiety as pedagogical catalyst

The findings also illuminate a productive tension between anxiety and agency. Consistent with Mezirow's (1991) transformative learning theory, the "disorienting dilemma" created by real-world stakes (actual financial accountability, live customer relationships and consequential decisions) disrupted the assumptions underlying students' academic self-schemas and precipitated meaningful learning. The anxiety documented in the early journals was not a design flaw but a necessary pedagogical catalyst, consistent with Kolb's (1984) argument that learning occurs in the tension between concrete experience and abstract conceptualisation. The faculty-researchers' role in maintaining appropriate scaffolding (intervening to prevent irreversible failure while allowing students to experience the discomfort of genuine uncertainty) was critical to the productive channelling of this anxiety.

Sustainability as integrative professional learning

The internalization of sustainability documented in Theme 3 carries significant theoretical implications. In conventional business curricula, sustainability is typically taught as a distinct ethical module, isolated from financial and operational management. The findings of this study suggest that for Generation Z learners, sustainability is most effectively developed when it is embedded as an operational constraint within the functional DNA of a business. This constitutes a move toward what Sipos (2009) terms "transformative sustainability education" – learning that changes not only knowledge and skills but professional values and identity. The voluntary adoption of the Sustainability team's waste reduction protocol by the Finance and Operations department in Semester 2 is particularly significant, suggesting a cross-departmental transfer of sustainability norms that would be unlikely to occur in a conventional classroom setting.

The reflexive practitioner educator

Reflecting on the action research methodology, this study also illuminates a necessary shift in the role of the academic educator. Consistent with Johannesson's (2022) account of teacher learning in communities of practice, the faculty-researchers in this study navigated the dual identity of academic supervisor and silent business partner. The most challenging aspect of this role was managing the tension between allowing students to fail (for the sake of learning) and ensuring the venture remained commercially viable (for the sake of the industry partner). The Iterative Evolution phase of the Synergy Loop provided a structured mechanism for addressing this tension by enabling the educator to adjust pedagogical scaffolding based on observed student maturity across each cycle.

Conclusion and implication

This study has demonstrated that a campus-based, student-led Living Laboratory, operationalized through the Catalyst WIL Synergy Loop, represents a viable and effective alternative to externally hosted WIL models. The action research investigation confirmed that professional identity is not a theoretical acquisition but is forged through the friction of real-world stakes, student agency and industry-aligned accountability. As students navigated the complexities of a functional enterprise under peer leadership, they cultivated essential 21st-century professional competencies (collaborative leadership, adaptive resilience, systems thinking and ethical decision-making) that conventional pedagogical models are ill-equipped to develop.

The implications of this study align directly with key global sustainability imperatives. By enhancing graduate employability through authentic enterprise experience, the model

contributes to SDG 4 (Quality Education) and SDG 8 (Decent Work and Economic Growth). By embedding sustainability as a functional operational constraint, it advances SDG 12 (Responsible Consumption and Production). The campus-embedded design directly addresses the equity barriers associated with externally hosted WIL, making it particularly relevant for universities in the Global South (Jackson *et al.*, 2025; Williams *et al.*, 2025).

Based on the findings, the following recommendations are offered for practitioners seeking to implement or adapt the Catalyst WIL Synergy Loop:

(1) Strategic Visioning: Establish explicit pedagogical boundaries before commencing the enterprise. Faculty should articulate the curricular objectives of the laboratory and communicate clearly to students the distinction between academic risk and commercial risk.

(2) Industry Co-creation: Select industry partners willing to cede operational control and engage as co-designers rather than sponsors. The quality of the partnership determines the authenticity of the learning environment.

(3) Operational Praxis: Appoint a student GM through a transparent selection process and provide structured onboarding for the role. Invest in weekly scaffolding sessions to manage the anxiety-agency tension.

(4) Reflexive Evaluation: Use structured journal templates to ensure the quality of reflection is consistent across participants. Schedule dedicated focus groups at the end of each operational cycle, facilitated by a team member not involved in day-to-day operations.

(5) Iterative Evolution: Treat each cycle as a design experiment. Document protocol changes explicitly and communicate them to students and industry partners to build institutional memory and continuous improvement into the model.

Limitations and future research

This study acknowledges several limitations. The small, single-cohort action research design, while appropriate for the exploratory and iterative objectives of the inquiry, limits the generalisability of the findings. The reliance on a single campus context and one industry partner introduces contextual specificity that may not transfer to all institutional settings. The Operational Praxis phase places a significant emotional and cognitive load on participants, and future implementations should include explicit provision for student wellbeing support.

Future research should address these limitations through longitudinal multi-site designs that track participants' career trajectories beyond graduation, comparative studies across different WIL modalities and investigations into the scalability of the model for larger cohorts. The development of digital micro-credentials to formally recognise the non-linear competencies developed in Living Laboratory settings also merits empirical attention.

AI disclosure

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