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ENABLING LEARNING ENVIRONMENTS. INSIGHTS FROM AN INNOVATION-DRIVEN DESIGN COURSE

ENABLING LEARNING ENVIRONMENTS. PERSPECTIVAS DE UM CURSO DE DESIGN ORIENTADO PARA A INOVAÇÃO

ENABLING LEARNING ENVIRONMENTS. CONCLUSIONES DE UN CURSO DE DISEÑO ORIENTADO A LA INNOVACIÓN

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Abstract

Building upon Problem-Based Learning principles, this case study examines Enabling Learning Environments (ELEs) as facilitators for educational innovation through ethnographic observation of a post-graduation course in team-based innovation. Over the course of three months, the research explored what drives innovation in education, how ELEs are sustained, and how they can be intentionally designed. The study identified critical success factors in this educational context using direct observation, participant interviews, and course document analysis, applying thematic coding to identify emergent patterns. Findings reveal that effective innovation learning hinges on three elements: student mindset development, emotional scaffolding, and quality of human interaction. The case demonstrates that ELEs collapse when course structure constraints autonomy and thrive when learning occurs within environments balancing safety with diversity. This study contributes to educational practice by offering transferable insights such as facilitation techniques, feedback mechanisms, and collaborative frameworks for learning environment design focused on fostering innovation capabilities.

Keywords: enabling learning environments, educating for innovation, innovation in higher education, design-based learning, qualitative case study.

Resumo

Com base nos princípios da Aprendizagem Baseada em Problemas, este estudo de caso examina os Ambientes de Aprendizagem Possibilitadores (AEA) como facilitadores da inovação educativa através da observação etnográfica de um curso de pós-graduação em inovação baseada em equipas. Ao longo de três meses, a investigação explorou o que impulsiona a inovação na educação, como os ELEs são sustentados e como podem ser intencionalmente concebidos. O estudo identificou factores críticos de sucesso neste contexto educativo utilizando a observação direta, entrevistas aos participantes e análise de documentos do curso, aplicando a codificação temática para identificar padrões emergentes. Os resultados revelam que a aprendizagem eficaz da inovação depende de três elementos: desenvolvimento da mentalidade do aluno, apoio emocional e qualidade da interação humana. O caso demonstra que as EI entram em colapso quando a estrutura do curso restringe a autonomia e prosperam quando a aprendizagem ocorre em ambientes que equilibram a segurança com a diversidade. Este estudo contribui para a prática educativa, oferecendo conhecimentos transferíveis, tais como técnicas de facilitação, mecanismos de feedback e quadros de colaboração para a conceção de ambientes de aprendizagem centrados na promoção das capacidades de inovação.

Palavras-chave: ambientes de aprendizagem facilitadores, educar para a inovação, inovação no ensino superior, aprendizagem baseada em design, estudo de caso qualitativo.

Resumen

Partiendo de los principios del Aprendizaje Basado en Problemas, este estudio de caso examina los Entornos de Aprendizaje Posibilitadores (EAP) como facilitadores de la innovación educativa mediante la observación etnográfica

de un curso de posgrado sobre innovación basada en equipos. A lo largo de tres meses, la investigación exploró qué impulsa la innovación en la educación, cómo se sostienen los ELE y cómo pueden diseñarse intencionadamente. El estudio identificó los factores críticos de éxito en este contexto educativo mediante la observación directa, las entrevistas a los participantes y el análisis de los documentos del curso, aplicando la codificación temática para identificar patrones emergentes. Los resultados revelan que un aprendizaje innovador eficaz depende de tres elementos: el desarrollo de la mentalidad del estudiante, el andamiaje emocional y la calidad de la interacción humana. El caso demuestra que los ELE se colapsan cuando la estructura del curso restringe la autonomía y prosperan cuando el aprendizaje se produce en entornos que equilibran la seguridad con la diversidad. Este estudio contribuye a la práctica educativa ofreciendo ideas transferibles como técnicas de facilitación, mecanismos de retroalimentación y marcos de colaboración para el diseño de entornos de aprendizaje centrados en el fomento de las capacidades de innovación.

Palabras-clave: entornos de aprendizaje facilitadores, educar para la innovación, innovación en la educación superior, aprendizaje basado en el diseño, estudio de caso cualitativo.

1 INTRODUCTION AND BACKGROUND

In today's globally connected and rapidly evolving world, society is increasingly confronted with systemic and complex challenges that demand new forms of knowledge creation and application. As future decision-makers, students must be equipped not only with disciplinary expertise but also with the creative capacity to address such multifaceted issues. Traditional and vertically structured models of education are no longer sufficient. There is a pressing need to align higher education with the demands of complexity and uncertainty, fostering environments that support a transformative and creative mindset in learners. As Björklund et al. (2024, p.6) articulate:

> We live in an innovation economy and are in acute need of sustainable solutions to the issues we face in our societies and planet. Given this, it is perhaps unsurprising that the Future of Jobs Report by the World Economic Forum (2023) found that the need for creativity increased most of all skills.

In parallel, Feng et al (2024, p.1) examine the pedagogical reality of teaching creativity in higher education. While creativity is widely acknowledged as a critical competence for addressing societal challenges, it remains inconsistently embedded in practice:

> Creativity is widely recognised as a key competence in higher education for future graduates to address societal challenges through creative thinking and problem-solving. However, despite multiple definitions of creativity and pedagogies across disciplines, challenges remain in fully integrating creativity into teaching.

These tensions, initially observed by Sawyer (2006, as cited in Björklund et al., 2024), underscore the need to evolve higher education beyond knowledge transfer — towards learning environments that foster mindset transformation. Design Factories (DFs), as described by Björklund et al. (2019; 2024), represent a promising institutional response to this challenge. More precisely Björklund et al. (2024) emphasise the need for strategic experimentation and supportive policies to enhance collaboration and innovation across academic silos, ultimately contributing to societal progress.

Björklund et al. (2024) aim to synthesise the pedagogical choices and collaboration practices implemented to make educating for innovation work, with the hope of shedding light on different practices in various contexts. Although each Design Factory has its flavour of innovation and co-creation, DFs culture and practices typically emphasise collaboration and hands-on experimentation, with at least one of three complementary focuses: interdisciplinary learning in student programs, industry-academia collaboration to enhance real-world application of learnings, and fostering entrepreneurship. Building on core practices such as problem crafting, collaboration, and student support, Björklund et al. (2024) frame problem-, project-, and finally design-based learning (Gómez, Puente, Eijck, & Jochems, 2011) as a bridge between today's classrooms and tomorrow's challenges. In doing so, it echoes the design mindset defined by Herbert Simon in the 1960s (as cited in Björklund et al., 2024), which does not aim to predict the future but

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to create preferred futures — through education that is embedded in and responsive to its social and cultural surroundings.

Despite these advances, existing research on problem- and project-based learning, as well as interdisciplinary project teams (Hmelo-Silver, 2004; Prince & Felder, 2006; Strobel & Van Barneveld, 2009), has primarily focused on what students learn or how learning outcomes can be measured. Few studies examine the learning environments themselves as active agents in shaping innovation. One exception is Ellström et al. (2008), who distinguish between 'enabling' and 'constraining' environments in care work to explore how workplace structures affect learning and competence development. However, there is a noticeable gap in applying this lens to higher education contexts. This study addresses that gap by offering a situated, exploratory case study of an innovation-driven educational programme to identify and understand the characteristics of Enabling Learning Environments (ELEs) in higher education. Rather than offering prescriptive reform, the study provides insights that could support ongoing and future experimentation in educational design.

Additionally, the figure of the coach—a pivotal yet under-researched role within Design Factories—remains largely absent from scholarly literature. Unlike traditional lecturers or assessors, coaches act as facilitators of reflective dialogue, psychological safety, and learner trust. Their role is relational and catalytic, enabling the conditions necessary for creativity and risk-taking. Understanding how coaches operate—and how their presence differs from conventional academic roles— could offer further insight into the design of ELEs and the relational scaffolding required to sustain them.

2 RESEARCH AIM AND HYPOTHESIS:

This study aims to investigate how learning environments in higher education can be intentionally designed to support innovation, with a specific focus on the concept of Enabling Learning Environments. ELEs are understood as learning contexts that actively foster students' capacity for creative thinking, initiative-taking, and collaborative problem solving. Situated within pedagogical models such as Problem-Based Learning (PBL) and Team-Based Learning (TBL), ELEs are distinguished not only by their curricular structure but by the relational and environmental conditions they cultivate.

The objective of this research is to examine one such innovation-driven programme as a case study, to uncover the specific characteristics that make a learning environment effective for innovation. This involves observing and analysing the roles, spaces, tools, and social dynamics that interact to either enable or constrain learners' creative agency. Particular attention is given to the role of the coach, whose presence is hypothesised to be a critical enabler of psychological safety, reflective dialogue, and productive risk-taking.

Therefore, the research is guided by the following questions: What characteristics define an Enabling Learning Environment? How does the observed course embody ELE, and what lessons can be learned from this case?

The central hypothesis is that the intentional introduction of ELEs within higher education settings will foster in learners the creative mindset required to ideate valuable and context-aware solutions to complex challenges.

3 EXPERIMENTAL INNOVATION AND DESIGN:

At the core of this study is the integration of a conceptual framing (Learning Environments as enabling conditions) with an empirical design-led approach (interviews, focus groups, etc.), aimed at understanding how innovation can be fostered in higher education. The course under observation provided a unique, real-world context for experimentation-driven research, offering a dynamic setting in which to explore, illustrate, and extend the concept of ELEs in practice. In this research, ELEs are used not as predefined instructional models, but as an interpretive framework through which the characteristics of an innovation-supportive environment can be analysed.

3.1 Core innovation

The core innovation of this study does not lie in a new technological tool or curriculum structure, but in the application of a novel interpretive lens. By conceptualising and empirically testing the notion of ELEs using qualitative and design-based methods, the study contributes to framing ELEs as intentionally designable environments. Since ELEs have not been previously operationalised as a measurable or observable structure, this research offers initial empirical grounding and methodological articulation of the concept.

3.2 Experimental design

To examine how ELEs emerge and operate in practice, the study combined qualitative (e.g., thematic analysis and prompting) and ethnographic methods (e.g., shadowing, interviews, focus groups) with design-informed tools (e.g., journey mapping, systems thinking). Moreover, the study employed an action-research approach. The dual role of the researcher as both observer and course coach allowed for reflexive engagement, enhancing contextual sensitivity while maintaining analytical rigour.

3.2.1 Variables

This study considered several contextual variables related to the course environment, including coaching structure, team dynamics, and the broader institutional setting. The primary outcome variables of interest were students' reported sense of engagement, perceived support, autonomy, and expressions of an innovation mindset. Data on these outcome variables were primarily collected through qualitative methods, including semi-structured interviews and observational field notes, supplemented by quantitative survey responses. While direct behavioural measures (e.g., performance metrics) were not employed, the research focused on capturing rich experiential data through participants' lived experiences and subjective perceptions of the program.

3.2.2 Methodology

The core methodological of this study lies in its hybrid approach, which integrates ethnographic inquiry with design-based techniques. Journey mapping was used to trace shifts in student perception over time. Thematic prompting (including generative AI support) helped surface patterns and metaphors within the qualitative data, and systems thinking was applied to visualise the interdependencies between people, processes, and environmental features. Together, these tools and techniques uncovered a layered understanding of how enabling conditions are created, sustained, and experienced in the context of innovation-driven education.

4 METHODOLOGY AND DATA COLLECTION

The case study at the core of this research is a postgraduate programme focused on innovation and interdisciplinary teamwork. According to ME310 Porto (n.d.):

> For nine months, teams of 3 to 5 students, made up of members from various academic backgrounds, collaborate with partner organizations on professional innovation projects, experiencing, first-person, a human and human-centered innovation adventure. This approach promotes learning mainly through hands-on practice, allowing students to gain experience and expertise in the field of System Innovation, by using Design, Engineering, and Business concepts and tools, while working in an international context with a wide range of peer teams worldwide.

During the academic year, the programme underwent a strategic redesign. As previously stated, the researcher was embedded in the course both as a research intern and as a coach, allowing the course to serve as a live field site for observing and analysing the dynamics of a Learning Environment. The ELE concept served as the interpretive lens for examining how innovation-supportive learning environments are constructed and experienced.

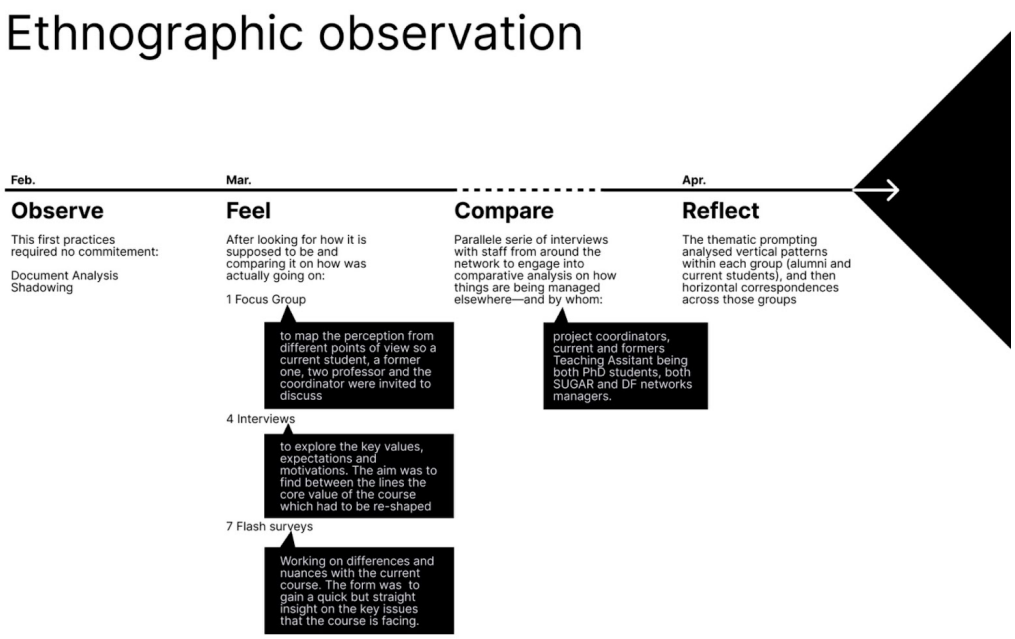
The study sample included two primary groups: current students enrolled in the course and a representative selection of alumni. Alumni were contacted through email and word-of-mouth referral, with an effort to include at least two participants from each previous edition of the programme. Although no fixed sample size was determined, participation was based on the availability and willingness of individuals to contribute. It is worth noting that the course has not been active for almost ten years, which has complicated access to the pool of former students.

Data collection combined multiple qualitative instruments. Semi-structured interviews were conducted with alumni and with staff from the wider network—including project coordinators, teaching assistants (many of whom were also PhD candidates), and network managers. Concurrently, a short, open-ended survey was administered to current students. This survey included four focused questions, completed without prior notification in approximately ten minutes, serving as an expedited alternative to flash interviews."

Fieldwork was conducted over three months (see Figure1). In Month 1, the researcher engaged in non-intrusive observation—akin to shadowing—by attending sessions to familiarise herself with the environment and compare it with expectations formed through desk research. In Month 2, a focus group was convened to map the programme's perceived value from multiple stakeholder perspectives, including a current student, a former student, two faculty members, and the pedagogical coordinator. Alumni interviews were also initiated during this phase, aimed at surfacing motivations, expectations, and reflections on past course editions. In Month 3, following a preliminary thematic synthesis of the Alumni interviews, the student survey was deployed to identify current challenges and contextual nuances. Additional staff interviews were conducted to support comparative analysis across different institutional practices and programme editions.

Figure 1

Research timeline



All interviews were audio-recorded with participant consent and subsequently anonymised in reporting to ensure confidentiality and ethical integrity.

5 DATA ANALYSIS PLAN

This study tests the hypothesis that introducing Enabling Learning Environments (ELEs) in higher education fosters the creative mindset necessary for learners to generate valuable, context-aware solutions. The analysis aims to identify how students perceive enabling conditions throughout their learning journey, and how these perceptions correlate with innovation-related behaviours and outcomes. Given the qualitative nature of this study, statistical analysis was not employed. Instead, analytical validity was assessed through the attainment of thematic saturation and the identification of recurrent patterns within the data.

5.1 Data preparation

Focus group and interview transcripts, along with survey responses, were transcribed verbatim and imported into a dedicated digital workspace. An initial phase of data preparation involved a thorough review of all materials to assess their relevance and completeness in relation to the research questions. Responses deemed tangential to participants' lived experiences within the learning environment were excluded from further analysis. Partial or incomplete

narratives were retained but flagged for cautious interpretation, acknowledging the potential for limited contextual understanding.

5.2 Descriptive overview

A summary of participant characteristics was compiled to contextualise the data (see Table 1). This includes:

- Number of alumni, students and staff involved
- Year of course participation
- Current field of study

Table 1

Participant characteristics

Group	n.	Year of involvement in the course	Field of Study or role at the moment of the participation
Alumni	4	a.y. 2016/2017 and a.y. 2017/2018	Design, Engeneering, Management
Students	7	a.y. 2024/2025	Design, Engeneering, Management
Staff (including TAs, coordinators and coaches)	10	–	PhDs

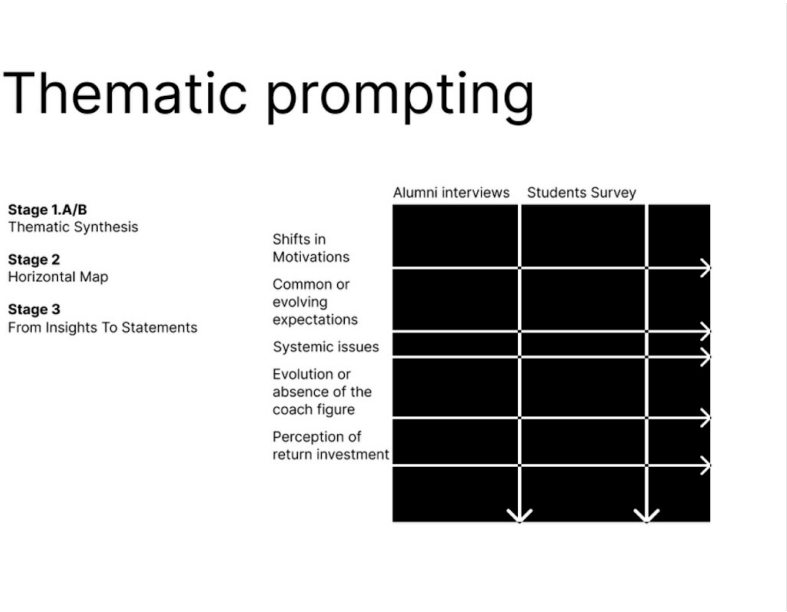
Note. This table summarises the profile of participants involved in the study. Fields of study and roles reflect primary domains reported during interviews.

5.3 Analytical process

Data were analysed thematically during the fourth month of the research timeline (see Figure 1), using a three-stage process (see Figure 2) that combined vertical and horizontal analysis strategies. The process was designed to capture both the individual group perspectives and broader cross-cutting themes.

Figure 2

Thematic prompting and analysis



Stage 1: vertical thematic analysis
Data were first analysed within each group (alumni and current students) using inductive coding aligned to predefined categories.

Alumni – Key themes:
1. Motivations and Decision-Making
2. External Influences
3. Perceived Value
4. Certification Perception
5. Coach Role & Recommendations

Current Students – Key themes:
1. Motivations
2. Expectations vs Reality
3. Challenges
4. Value & Investment Criteria

Stage 2: horizontal mapping
A comparative analysis was then conducted across both participant groups, identifying shared or divergent patterns such as:

- Shifts in motivation and perceived value
- Common or evolving expectations
- Structural gaps and systemic issues
- Evolution (or absence) of the coach figure
- Perceptions of return on investment (both financial and experiential)
- Cultural or economic constraints (Portugal-specific)

Stage 3: From Insights to Design Statements
In the final phase, insights from the analysis were synthesised into high-level statements and design opportunities. These aimed to articulate how specific enabling conditions contribute to the development of innovative mindsets in learners and to explore the environmental characteristics necessary to support such transformation.

6 USE OF GENERATIVE AI IN DATA INTERPRETATION

In a collaborative approach to thematic analysis, generative AI tools served as a valuable form of sensemaking support, enriching the process of insight synthesis. Used strategically and with critical oversight, these tools helped surface salient metaphors, reframe emergent themes from novel perspectives, and explore complex relational patterns within the data. AI prompts were carefully crafted to complement human interpretive capabilities, ensuring that all findings remained grounded in the empirical material and informed by the researcher's expertise.

To uphold analytical rigour throughout the AI-supported analysis, the following principles were applied:

- AI-generated outputs were used solely to refine and articulate pre-existing themes, rather than as independent sources of findings.
- Human judgment and verification against the raw data remained paramount in all analytical decisions.
- Final interpretive statements and conclusions were developed exclusively by the researcher, ensuring contextual sensitivity and theoretical coherence.
- Comprehensive prompt logs were meticulously maintained and archived to ensure transparency and facilitate reproducibility of the AI interaction process.

The overarching principle guiding this process was balance: leveraging AI to enhance—rather than replace—human analytical capacities. AI was framed as a creative collaborator, capable of augmenting ideation and linguistic synthesis, but not equipped to contextualise findings, understand nuance, or infer meaning beyond prompt boundaries. This approach aligns with the emerging concept of humanistic AI, which centres on using artificial intelligence in ways that amplify human creativity and agency. This humanistic AI approach was grounded in three mindsets:

Regarding the responsible mindset, AI is understood as a tool and must be used with clear ethical boundaries. The boundaries are made in order to avoid the use of AI as a tool for circumventing the Design Process, instead accompanying it step by step —ensuring responsible use without delegating critical interpretation to the machine.

The explorer mindset is driven by curiosity, not only as an attitude but also as a methodological approach. Exploratory prompting was used to test, challenge, and extend ideas. Prompts such as "What is left unsaid?" or "What do you understand from this?" were iteratively refined to extract new angles or synthesise divergent viewpoints. It is for this reason that patience and iteration are essential to finesse the prompting.

The interactive mindset is based on treating the prompting as a conversational exchange – positioning the AI not as a passive tool but as an interlocutor in an active dialogue. Maintaining a human tone and treating the tool as a thinking partner enabled more expansive ideation and reframing. The use of human approaches to workflows pushes and expands possibilities.

7 OUTCOMES AND POTENTIAL IMPACTS

In the context of design research, an insight can be defined as a revelation of knowledge that simplifies complexity, allowing a situation or phenomenon to be understood in a new light. The insights presented here did not emerge from surface-level responses but instead from iterative cycles of reflection, reframing, and metaphorical translation, grounded in interviews, surveys, focus group data, and AI-supported sensemaking.

Through this process, two central insights were identified, each helping to articulate the enabling and disabling dynamics of innovation within this specific learning environment (see Table 2).

Table 2

Synthesis of Insights, Sources, and Drivers

Insight	Driver type	Source(s)	Illustrative example
ELEs collapse when autonomy is not matched by structure	Disabling	Alumni interviews, student surveys, and observation	"The myth of autonomy" and "The lighthouse"

ELEs thrive on safety, diversity, scaffolding, and human presence	Enabling	Student surveys, focus groups, and coach reflections	"The loop between aspiration, expectation, empowerment"

Note. Insights were developed through iterative thematic analysis, supported by metaphor extraction and cross-case comparison. Data sources included alumni interviews (n = 4), staff interviews (n = 10), student surveys (n = 7), and non-participant observation.

Insight 1: ELEs collapse when autonomy is not matched by structure:

Across all data sources, students expressed a strong need for freedom — to make decisions, shape their own processes, and diverge from predefined tracks. However, when this autonomy is not accompanied by explicit scaffolding, expectations, or a support structure, it leads to confusion, frustration, and disengagement. In this case, the learning environment shifts from being "supportive" to feeling "free-floating".

A powerful conceptual metaphor that emerged from alumni interviews was "The myth of autonomy", describing how innovation environments require not just freedom, but also space for doubt, mentoring through uncertainty, and time to reflect. This metaphor is closely tied to "The emotional landscape" —the need for environments that acknowledge uncertainty as part of the innovation journey. On the other hand, from the student perspective, the metaphor of "The lighthouse" illustrates the importance of structure: navigating innovation is like sailing in fog—learners need both a course (tools and processes) and a lighthouse (a person who helps recalibrate). In complex innovation environments getting lost is expected, but staying lost is a sign of failed scaffolding. A consistent pattern emerged across groups, referred to as "The safe zone": learners do not request strict guidance, but they do seek visible pathways, defined roles, and responsive coaching. Freedom without anchors does not lead to exploration; rather, it leads to stagnation or withdrawal.

Insight 2: ELEs thrive on safety, diversity, scaffolding, and human presence:

Innovation flourished most clearly when students felt emotionally and socially safe. This safety was not incidental — it was actively created through human presence who listened, mirrored, and engaged with learners' processes. Students emphasised the need to be seen, heard, and constructively challenged.

A statement that captures this dynamic is "Expectations are not aspirations". Students often articulated only logistical or structural expectations, avoiding deeper aspirations—possibly as a form of self-protection. Without strong scaffolding, learners appeared to lower their expectations, from aspirational to logistical. This theme aligned with an alumni comment: "You get as much as you give." Together, these patterns revealed a loop between aspiration, expectation, and empowerment: to learn innovation deeply, students must be willing to risk effort, emotion, and ideas. However, that risk-taking is only possible when they trust the environment to support them. In this sense, emotional scaffolding—through rituals, reflection moments, and peer dialogue—proved as critical as deadlines and rubrics in shaping behaviour and mindset.

7.1 Insights statements

Building upon Insight 1, Enabling Learning Environments (ELEs) are not solely a product of strong curricula; instead, they are actively co-created through intentional human presence. Specifically, coaches and mentors transcend the role of mere facilitators, functioning as integral co-creators of the enabling environment.

Informed by Insight 2, innovation is not driven by content, but rather by a specific mindset that requires deliberate and ongoing support. A critical factor in fostering this mindset is the establishment of a learning environment where individuals feel secure enough to venture beyond their comfort zones, thereby unlocking a significantly greater potential for innovation

7.2 Scientific impact

This study contributes to the previously cited growing body of research exploring how design-based pedagogies can be structured to support an innovation mindset in learners. By framing ELEs as designable environments rather than accidental outcomes of sound teaching, this research opens up a new avenue for experimentation within higher education—advancing the concept of ELEs as hybrid emotional-structural environments, not merely pedagogical formats. The research also lays the groundwork for future longitudinal or comparative studies across institutions, particularly those that embed design-driven innovation into formal curricula.

7.3 Practical impact

The findings of this study suggest applications for a range of educational stakeholders:

- Higher education programme coordinators, particularly those overseeing interdisciplinary or innovation-focused programmes, can use the findings to inform curriculum development, coaching frameworks, and the design of the learning environment.
- Coaches and facilitators may benefit from a reframed understanding of their roles — not only as guides, but also as activators of trust and exploration.
- Policy-makers and funders interested in educational innovation can look to ELEs as a measurable framework for evaluating the impact of teaching practices.

8 LIMITATIONS

As with all qualitative research grounded in specific contexts, this study is subject to several inherent limitations:

- Sample Size and Generalizability: The limited sample size, particularly among alumni participants, may constrain the generalizability of the findings to broader populations or contexts. Further research with larger and more diverse samples is warranted to validate these findings.
- Researcher Bias: The dual role of the researcher as both observer and coach, while enriching contextual understanding, introduces the potential for interpretive bias.
- Contextual Specificity: The findings are situated within a single course at a single institution, limiting the transferability of insights to other institutional, cultural, or disciplinary settings. Future investigations should explore the influence of these factors on the phenomena under investigation.
- Longitudinal Outcomes: The study did not assess the long-term impact of the program on participants' innovation mindsets or their application of these mindsets in post-programme contexts. Longitudinal studies are needed to determine the sustained effects of the intervention and its relevance to professional practice.
- Generative AI and Interpretive Constraints: The use of generative AI as a sensemaking tool remains exploratory and inherently interpretive, precluding standardised or automated replication. Furthermore, the capacity of AI to contextually interpret complex social dynamics or to synthesise affective, temporal, or contradictory data is limited. Consequently, its application was rigorously confined to supportive synthesis, rather than conceptual decision-making. While AI offered valuable assistance in identifying patterns and reframing themes; the ultimate responsibility for interpretation and meaning-making rested with the researcher. Future research should explore methods for enhancing the transparency and replicability of AI-assisted qualitative analysis, while acknowledging the fundamental role of human judgment."

9 CONCLUSIONS

This article makes a substantial contribution to understanding how spaces, relationships, and roles can be intentionally designed to support innovation in higher education – specifically by identifying the emotional and relational preconditions for risk-taking and creativity within complex learning environments. It demonstrates that innovation-driven programmes require educational logics that differ from traditional models, aligning academic knowledge creation with the demands of a complex, rapidly evolving world, as outlined in the introduction.

Within this context, learning is framed not as instruction but as a practice of co-creation and exploration. While ELEs aim to empower learners, this empowerment must be carefully scaffolded — not prescribed. More importantly, how institutions navigate this balance may determine their capacity to foster innovation. Traditional educational institutions may not be structurally or culturally equipped to support ELEs as their rhythms, assessment models, and teaching roles often conflict with the relational and reflective scaffolding these environments require.

Although this study did not directly investigate educational structures, it raises important questions about whether – and how – traditional academic settings can create the conditions for enabling environments to emerge. These

questions open avenues for future research that may prove valuable: When enabling conditions were absent, what outcomes emerged? Were there key moments in the learning journey that acted as inflection points? Ultimately, ELEs challenge us to rethink not only how we teach, but how we relate — to students, to uncertainty, and to the futures we hope to co-create through education.

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