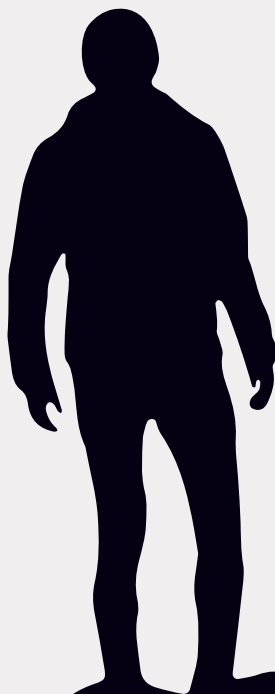


# JOURNAL OF SKILLS DEVELOPMENT



# G I L E

GALVANISING INNOVATIVE LEARNING ENVIRONMENTS

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#GJSD. Sharing today. Shaping tomorrow.

**SUBMIT**

Dear Reader,

This issue brings together contributions that reflect a shared concern: how we develop meaningful skills in an increasingly complex, AI-mediated world. This aligns closely with GJSD's mission to explore skills development across disciplines, contexts, and cultures.

In this context, in times when education and work are being reshaped simultaneously by technological acceleration and global uncertainty, it feels both timely and necessary to pause and reflect on how we teach, learn, and prepare for the future. This issue of the GILE Journal of Skills Development brings together a diverse yet interconnected set of contributions that explore these questions from multiple perspectives ranging from artificial intelligence in education and teacher development to student engagement, employability, and curriculum transformation.

The collection opens with papers that engage directly with the systemic implications of AI and digital transformation in education. These contributions highlight not only the opportunities but also the uncertainties and pressures that educators experience as they navigate increasingly complex technological environments.

From there, the focus shifts toward teacher development, with particular attention to Generation Z educators, whose emerging professional identities are shaped by sustainability, innovation, and even popular culture as a space for leadership learning.

A third group of papers brings the student perspective into focus, exploring motivation, communication, and the often underexplored learning potential of real-world experiences such as work placements. These insights are complemented by a study situated at the intersection of education and the workplace, examining emotional intelligence as a key competence in AI-mediated, intercultural professional contexts. The issue then broadens to address curriculum and policy challenges, highlighting the role of higher education in fostering entrepreneurship and responding to pressing socio-economic needs.

The issue concludes with two "Food for Thought" contributions that invite us to step back and critically reflect on broader questions: the integrity of research in the age of social media, and the evolving role of business education in a VUCA world shaped by AI. These pieces do not aim to provide definitive answers, but rather to open up space for dialogue, questioning, and rethinking.

Over the past year, we have seen GJSD continue to grow, both in terms of the diversity of topics we engage with and the international network of scholars and practitioners who contribute to it. One of the most encouraging developments has been the number of collaborations between established researchers and emerging scholars. Several papers in this issue reflect exactly this kind of partnership. This, in itself, is a powerful reminder that developing skills is not only the subject of our research, but also the way we work together as a scholarly community.

I would like to take this opportunity to thank everyone who made this issue possible: the authors for their thoughtful and rigorous work, the reviewers for their time and constructive feedback, and the editorial teams for their dedication behind the scenes. It is through this collective effort that GJSD continues to evolve as a space not only for publishing research, but for building a community around skills development in its broadest sense.

What I take from this collection is that skills development today is deeply relational and context-dependent, shaped by collaboration, reflection, and a willingness to engage with complexity.

I warmly invite our community to read and reflect on the insights shared here. My hope is that this issue will not only inform your thinking but also inspire you, as it has inspired me. I also encourage you to bring these ideas into your classrooms, research, and professional conversations.

Happy reading!

Warm regards,

**Dr habil. Judit Beke**

Dr habil. Judit Beke is the Editor-in-Chief at GJSD



# GILE Journal of Skills Development

## The Antecedents of Artificial Intelligence-induced Pedagogical Designing Technostress among International Science Educators: Latent Content Insights from Reddit Commentaries

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### Abstract

Artificial intelligence (AI) is rapidly advancing and increasingly embedded in education, provoking debates on its detrimental effects on teaching and learning, particularly within highly structured disciplines such as the sciences. This study examined the antecedents of Artificial Intelligence-induced Pedagogical Designing Technostress by analysing commentaries posted by science educators from diverse countries who actively engage in professional exchanges and discourses on Reddit. From a total of 210 datasets, collected through a meticulous Python- and Theoretical Framework-assisted data scraping process and verified manually for contextual integrity, the study employed Latent Content Analysis to chart the science educators-Redditors' lived experiences across science-related subreddits. Three (3) themes emerged: *Disruptions to Coherent Science Lesson Design*, *Uncertainties in Science Pedagogical Integration*, and *Pressures of Efficiency-Propelled Science Instruction*. Theoretically, the inquiry extends conceptualisations of technostress by situating it at the intersection of AI and pedagogical designing, demonstrating how algorithmic mediation reshapes science educators' epistemic and ethical responsibilities. Practically, it underscores the urgency to move beyond fragmented experimentation and develop structured institutional mechanisms and professional development pathways that equip science educators to critically appraise AI-generated content while preserving disciplinary autonomy.

**Keywords:** artificial intelligence, pedagogical designing, technostress, science educator, Reddit, latent content analysis

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## 1. Introduction

Artificial intelligence (“*AI*”) has rapidly shifted from the peripheries of technological speculation to the centre of modern human activity and productivity (Butson & Spronken-Smith, 2024). Its applications now permeate industries as diverse as healthcare, finance, communication, and education (Walter, 2024). With the proliferation of agentic generative systems, including large language models (LLMs), such as the Chat Generative Pre-trained Transformer (ChatGPT), and intelligent tutoring systems, AI has acquired unprecedented dominance in shaping knowledge creation and dissemination (Burger et al., 2023). The release of ChatGPT-5 in 2025 further reinforced this upward trajectory, placing AI at the focus of professional practice and amplifying expectations of its use in schools and universities (OpenAI, 2025). The education sector, long marked by gradual reforms, now confronts a decisive technological turning point where AI not only supplements but also redefines how teaching is conceptualised and executed.

The impact of AI in education remains deeply paradoxical. On one hand, AI promises considerable efficiency, streamlining routine work such as test item generation, lesson planning assistance, and administrative tracking (Labadze et al., 2023). Content creation, workflow automation, and chatbots functioning as teaching assistants open new opportunities for productivity. In stark contrast, these affordances risk distorting the educational endeavour. Brisk teaching facilitated by predictive tools may dilute carefully structured pedagogical sequences, with AI sometimes yielding scientific inaccuracies, hallucinations of data, or formulaic phrasing (Taufikin et al., 2024). Despite attempts to humanise outputs, educators face the possibility of academic malpractice and negligence if they rely on AI without thoughtful restraint. Almasri (2024) contends that such dilemmas are particularly prominent in science education, where precision, methodological rigour, and developmental appropriateness remain non-negotiable in the facilitation of teaching and learning.

At the core of this tension is the act of Pedagogical Designing (“*PD*”). Operationally, it is the applied dimension of pedagogical content knowledge (PCK), the ‘special amalgam of content and pedagogy that is uniquely the province of teachers’ (Shulman, 1987, p. 8). PD refers to systematically planning learning activities, teaching-learning episodes, and assessment tools grounded in instructional philosophies, precepts, theories, and contextual realities (Davis et al., 2011). In the realm of professional education praxis, the ‘pedagogical design capacity’ (Knight-Bardsley & McNeill, 2016, p. 645) ought to be embodied by educators, who entail curating lessons that scaffold inquiry, emphasise conceptual understanding, and balance cognitive, affective, and psychomotor learning outcomes. Tellingly, judicious PD, especially in science teaching, ensures that learners engage with scientific processes, from hypothesising and experimenting to critical reflection (Saribas & Ceyhan, 2015). The intrusion of AI into these processes can support and compromise such aims. If AI tools are utilised prudently, they may enrich science educators’ repertoire of strategies. However, if such educators reduce lesson design to predictive algorithms, science education risks losing its investigative depth and degenerating into selective learning design detached from authentic scientific practice.

Contemporary science education scholars argue that the intersection between technological platforms, such as AI, and pedagogical knowledge frameworks warrants closer examination. Frameworks such as Technological Pedagogical Content Knowledge (TPACK) highlight the intersections between content expertise, pedagogical skill, and technological fluency (Sheffield et al., 2015). In science education, AI alters these construct intersections in complex ways. AI strengthens technological knowledge (TK) and reshapes technological content knowledge

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(TCK) by providing novel simulations, visualisations, or adaptive experiments. However, PCK, and eventually PD, which require mindful consideration of learners' misconceptions and disciplinary difficulties, cannot simply be delegated to machines. Filiz and associates (2025) posited that educators must adapt to AI, exercising change management while ensuring that scientific content is taught with fidelity. The evolving regulatory landscape only magnifies the stakes, as policies in many contexts remain underdeveloped in responding to the rapid proliferation of AI tools (Doria, 2024).

Whether inward-tending or outside-looking, the wider socio-educational and technological environment reinforces this urgency. Digital democracy and citizenship now frame how learners access and engage with knowledge (Christensen et al., 2021). In science education, the democratisation of resources means that students increasingly explore laboratory simulations or problem-solving platforms independent of educators (Kolil & Achuthan, 2024). While this represents a positive expansion of opportunities, it also raises risks of AI misuse and abuse, including exposure to oversimplified explanations or misleading outputs. Siason (2021) noted that Competent and Responsive Education (CaRE) requires educators to safeguard the disciplinary integrity of teaching. In the larger purview of this inquiry, this meant ensuring that AI functions only as an agent or conduit of learning, not as a replacement for pedagogical judgment.

Science educators, however, confront mounting pressures amidst the evolving demands of 21<sup>st</sup> century science education. Heavy workloads, performance expectations, and the demand for constant adaptation to technology create fertile ground for Technostress (“*TS*”). Defined as the psychological, emotional, and behavioural strain experienced when technological demands exceed adaptive capacities, TS manifests in anxiety, fatigue, and diminished teaching quality (Li & Wang, 2021). The condition is intensified in science classrooms, where lesson design must anticipate laboratory work, project-based activities, and complex assessments. The risk lies in educators' well-being and in students' diminished opportunities to develop critical, creative, and reflective thinking through authentic scientific tasks (Upadhyaya & Vrinda, 2021).

Despite these risks, international bodies continue to advocate the active embedding of AI into education. The Programme for International Student Assessment (PISA) 2029, for instance, will incorporate *Media and AI Literacy* (MAIL) as a new domain, reinforcing the expectation that students and educators engage with AI (Media & Learning, 2025). However, science educators navigate this terrain without robust pedagogical taxonomies of AI integration. The authors argue that the novelty of AI in education, the worrying pattern of AI misconduct, and the unsettled frameworks of pedagogical adaptation all contribute to Artificial Intelligence-induced Pedagogical Designing Technostress (“*AIPDTS*”). Learning facilitators often resort to AI to meet deadlines or standards, but in doing so, may lose touch with the relational and inquiry-driven nature of science teaching (Park et al., 2023). When this dimension is side-tracked, the potential to harness AI as a catalyst for deeper inquiry, creative exploration, and relationally grounded science learning is left unrealised.

Although recent research has examined TS in general educational contexts (Bourlakis et al., 2023), there remains a scarcity in the extant literature on how AI specifically shapes the PD of science educators while actively avoiding the perils of TS. This represents a critical blank spot requiring urgent scholarly attention as 21<sup>st</sup> century science teaching intersects cognitive demands, technological innovation, and ethical responsibility. To surface these dynamics, it is essential to examine the candid voices regarding the antecedents of AIPDTS among science

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educators far and wide. Online discussion fora, such as *Reddit*, provide in-depth avenues for such intellectualised expressions, offering a distinctive advantage over conventional data sources such as plain interviews (Karnovsky & Gobby, 2024). Its anonymity allows science educator-*Redditors* (Reddit users) to articulate the origins of concerns, apprehensions, and misgivings about AI integration in science with candour, free from institutional censorship or professional constraints (Staudt-Willet & Carpenter, 2020). The international composition of the *subreddits* (thematic discussion fora) in this inquiry ensured that perspectives are drawn from diverse educational systems, enriching the scope of analysis and capturing the global resonance of TS in science education. The dialogical structure of such threads further revealed how ideas are debated and portrayed, offering insights into individual reflections and collective meaning-making. For a phenomenon as emergent and sensitive as AIPDTS, Reddit served as a dynamic and context-rich arena for the emergence of latent perspectives related to the nature of this study. Such a lived experience is a text that needs to be read.

Considering these arguments, this qualitative study purported to answer the **central research question**: *What latent themes characterise the antecedents of AIPDTS among international science educators, as discerned from Reddit commentaries?*

## 2. Theoretical Framework

The Mutually Engaging Encounter with Technology (“*MEET*”), a theoretical underpinning popularised in a grandparenting-technology study (Gonzalez et al., 2025), offered a strong conceptual anchorage for examining the antecedents of AIPDTS among international science educators. It emphasises the value of sustained, reciprocal, and healthy engagement with technology. In this inquiry, it suggests that science educators can collectively maximise the pedagogical potential of AI only when their utilisation remain balanced rather than stress-inducing. By situating TS within mutuality and symbiotic dynamics, MEET enabled the identification of the origins of the stressors in PD while being open to the determination of actionable solutions that could reduce such strains while strengthening professional practice. Its alignment with the methodological nature of Latent Content Analysis (“*LCA*”) further concretised the uncovering of educators’ digital narratives from Reddit, providing nuanced insights into how AI reshapes teaching and learning in science education.

## 3. Methods

### 3.1. Research Design

LCA offered a robust means of unpacking the narratives among Redditors (Graneheim et al., 2017), revealing underlying antecedents of AI-induced TS in PD within science education that may remain hidden when examined solely through surveys or structured interviews. Unlike Manifest Content Analysis, which confines itself to surface-level analyses of words and phrases, LCA provides a more nuanced lens by interpreting the underlying intentions, assumptions, and tensions embedded in discourse. This distinction was crucial because the study was conducted on Reddit. On this platform, user interactions are mediated by anonymity and cultural subtexts that often blur explicit expression yet carry profound experiential meaning. Accordingly, LCA illuminated these deeper layers of meaning, allowing readers of this inquiry to easily understand the antecedents of TS as they unfold in AI-driven PD in science education.

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### 3.2. Data Corpus Source (The International Science Educators-Redditors)

The data corpus comprised Reddit users self-identifying as science educators who actively engaged in discussions across internationally oriented subreddits such as *r/ScienceTeachers*, *r/Teachers*, *r/education*, and *r/edtech*, among others. These online communities are characterised by transnational membership, with contributors representing educational systems from countries including the United Kingdom, the United States, Canada, Australia, India, and the Philippines. The inclusion of such subreddits ensured that the dataset reflected an international professional discourse rather than a geographically bounded sample. Although the original posters' identities were anonymous in line with Reddit's data policies, clues such as language use, classroom examples, and mentions of different national curricula indicated that the commenters came from various countries. Consequently, the study treated these Redditors as an international cohort of science educators collectively articulating lived experiences and reflections on AIPDTS.

### 3.3. Data Gathering Procedure

#### 3.3.1. Automated Searching Procedure

Automated data collection was conducted using Python version 3.13.7 and the Python Reddit API [Application Programming Interface] Wrapper (PRAW). The retrieval targeted a wide array of posts and comments containing the central keyword “*artificial intelligence*” or “*AI*” across multiple science education-related subreddits fielded by science educators from different countries within a predefined time frame. By anchoring the search on central keywords, the procedure lifted all instances in which such terminologies appeared in the history of various science education-related subreddits, ensuring comprehensive coverage of discussions in the chosen online fora. Metadata such as subreddit names and all associated comments were extracted, with error handling and automatic retries ensuring exhaustive reach in the script. The selected timeframe of January 2022 to July 2025 was intentionally configured to capture the evolving trajectory of AI integration in education, from its initial mainstream adoption to its pedagogical normalisation. This span allowed the study to make sense of the shifts in science educators' perceptions as generative AI tools progressed from experimental novelty to institutional utility. Limiting the data to this window ensured analytical coherence by focusing on the formative years when discourse around AI's educational value, risks, and professional implications was most dynamic and revealing.

FIGURE 1. ‘*A PRIORI*’ TERMINOLOGIES FROM THE LITERATURE THAT MAY HINDER THE ATTAINMENT OF THE MEET



Source: Created by the first author via <https://www.wordclouds.com/>

To systematically identify TS-related content in the context of PD, the full dataset (n = 10,014 comments) was scrutinized to retain topic-sensitive remarks, providing a robust springboard for uncovering the antecedents of AIPDTS. Guided by the theoretical underpinning of the inquiry, certain *A priori*-derived keywords (see Figure 1) drawn from the related and extant literature that may potentially impede the attainment of the MEET, including “*stress*” (Delello et al., 2025), “*overload*” (Promsiri, 2025), “[early onset digital] *burnout*” (Duan & Zhao, 2024), “*fatigue*” (Julien, 2024), “*strain*” (Tang & Liao, 2025), “*pressure*” (Gayed, 2025), “*anxiety*” (Yalçın et al., 2024), and “[work-life] *imbalance*” (Huang & Zhao, 2025) were used to narrow down the resulting original dataset from the initial broad search. Applying these keywords in a subsequent Python processing, 210 comments were identified as directly linked to the TS experienced by the science educator-Redditors. The remaining 9,804 remarks were excluded from further analysis as they did not exhibit explicit connections to the adverse effects of AI on science educators’ work and well-being during episodes of PD, and were not tagged as avenues to cull the antecedents of AIPDTS. Table 1 summarizes the number of included and excluded commentaries across identified subreddits.

TABLE 1. DISTRIBUTION OF TECHNOSTRESS (TS)-RELATED AND NON-RELATED COMMENTS PER SCIENCE EDUCATION-CENTRIC SUBREDDIT (2022–2025)

Science Education-related Subreddit	TS-related comments (Included)	TS-non-related comments (Excluded)	Total
<i>r/Teachers</i>	109	5000	5109
<i>r/education</i>	57	2000	2057
<i>r/edtech</i>	26	1500	1526
<i>r/ScienceTeachers</i>	11	800	811
<i>r/teachingresources</i>	5	300	305
<i>r/CSEducation</i>	2	100	102
<i>r/PhysicsTeachers</i>	0	50	50
<i>r/ChemistryTeachers</i>	0	50	50
<i>r/AcademicTechnology</i>	0	4	5
Grand Total	210	9804	10014

Source: Constructed by the first author from the Python data

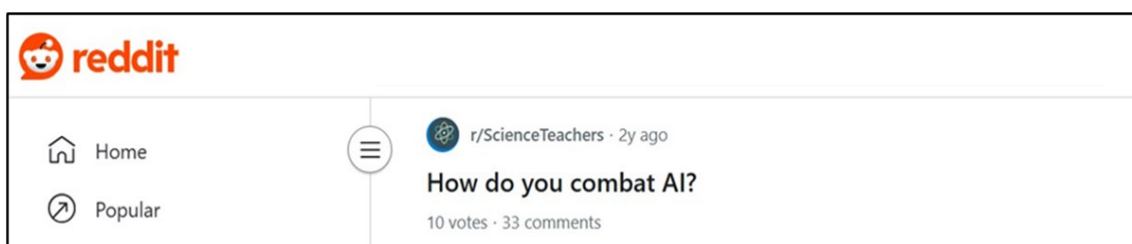
From the initial pool of 10,014 comments, only 210 ( $\approx 2.1\%$ ) were tagged as directly related because the filtering and analytic procedures were intentionally stringent, focusing solely on comments that strongly reflected the construct of interest. This relatively small subset is expected in large online datasets where much of the discourse is tangential and off-topic. Notably, these 210 comments were contributed by different Redditors across multiple subreddits rather than concentrated in a single thread, making them a diverse yet focused core of data for generating meaningful insights.

### 3.3.2. Hand Searching Procedure

Building on the filtered dataset, verification of the significant comments through hand searching (Figure 2) transpired, guided by strict inclusion criteria to ensure its thematic potential and relevance, to wit: (a) content explicitly addressing AI in science PD or teaching strategy planning; (b) posts and commentaries written in English; and (c) publicly accessible content not originating from deleted, removed, or locked accounts. The manual searching modality enabled the verification of the most significant statements and identification of recurring

patterns of AIPDTS, ensuring a rigorous and comprehensive thematic analysis of the international science educators' experiences. No remark has been tagged as loosely or partially related, resulting in all commentaries' retention (See Section 3.4.3). The targeted subreddit post analyses revealed that most TS-related comments among science educators originated from *r/Teachers* (n = 109), *r/education* (n = 57), *r/edtech* (n = 26), *r/ScienceTeachers* (n = 11), *r/teachingresources* (n = 5), and *r/CSEducation* [STEM-related] (n = 2).

FIGURE 2. A SAMPLE OF THE VERIFICATION OF A REDDIT POST AND ITS COMMENTARY CONTENTS THROUGH HAND SEARCHING



Source: Screen captured by the first author from <https://www.reddit.com/>

### 3.4. Mode of Analysis

#### 3.4.1. The Qualitative Content Analysis (QCA) as the Theme Elicitation Technique

A total of two hundred and ten (210) significant remarks were ultimately subjected to LCA. The data reduction procedure adopted in this study followed the four-step process outlined by Bengtsson (2016) in QCA. Decontextualisation involved identifying meaning units from the significant comments, while Recontextualisation required verifying the inclusion of essential meaning units and excluding irrelevant or redundant ones. In the Categorisation stage, condensed meaning units were systematically grouped to generate categories or code clusters, which subsequently led to the development of themes in the Compilation stage, thereby uncovering the underlying meanings embedded in Redditors' discussions.

#### 3.4.2. The Comprehensive Thematisation Trail of the QCA

Each comment was first assigned a provisional code corresponding to its semantic anchor, the explicit or implicit idea it conveyed about TS. Rather than grouping data immediately by theme, the coding distribution was initially mapped according to the subreddit of origin to preserve contextual nuance and discourse tone. This approach yielded a discernible trend in the distribution of coding frequencies across the six (6) subreddits (See Table 2), revealing distinct participation intensities in the construction of sub-themes. The subreddit *r/Teachers* emerged as the most prolific contributor, demonstrating strong thematic density in *Ambiguities in Science Practical Application* (n = 25) and *Incongruence Across Science Learning Concepts* (n = 25), followed by its significant input in *Restriction of Teacher Autonomy due to Prescriptive Outputs* (n = 20). This dominance indicates that educators in this forum primarily articulated challenges rooted in professional autonomy and contextual uncertainties of AI integration.

In contrast, *r/education* ranked second in overall frequency, contributing heavily to *Ambiguities in Science Practical Application* (n = 10) and *Misalignment with Science Pedagogical Goals* (n = 11), as well as offering considerable data for *Incongruence Within a Science Learning Concept* (n = 11). Thematically, the comments from *r/education* displayed a recurring concern over epistemic instability, ethical-pedagogical divergence, and the pedagogical strain imposed

by ambiguous institutional directives. Meanwhile, *r/edtech* accounted for moderate yet conceptually rich codes (n = 26), distributing its emphasis across nearly all sub-themes, particularly in *Incongruence Across Science Learning Concepts* (n = 8), *Misalignment with Science Pedagogical Goals* (n = 5), and *Restriction of Teacher Autonomy due to Prescriptive Outputs* (n = 2). This subreddit served as a critical locus of discourse on technological overreach and the algorithmic shaping of instructional routines.

The smaller but specialised subreddit *r/ScienceTeachers* (n = 11) contributed nuanced insights, primarily enriching sub-themes on epistemic misalignment (*Incongruence Across Science Learning Concepts*, n = 3) and reflective depth (*Prioritisation of Performative Speed over Pedagogical Depth*, n = 2). These contributions revealed discipline-specific apprehensions regarding conceptual coherence and professional identity in AI-mediated science instruction. By comparison, *r/teachingresources* (n = 5) and *r/CSEducation* (n = 2) registered the least coding activity, though their inclusions were instrumental in contextualising pragmatic concerns. The former provided evidence of pedagogical fatigue and verification-induced stress (*Incongruence Within a Science Learning Concept*, n = 3), while the latter captured the most technologically deterministic expressions under *Prioritisation of Performative Speed over Pedagogical Depth* (n = 2).

The subsequent coding process revealed distinct patterns of recurrence per subreddit, which subsequently guided the clustering of sub-themes. For instance, in *r/Teachers* and *r/education*, a large proportion of codes revolved around pedagogical mediation burden, implementation uncertainty, and institutional AI impositions, indicating collective concerns over professional role adaptation and workload redistribution. In contrast, *r/edtech* commentaries more frequently produced codes such as algorithmic dependency, technocentric governance, and automation-driven expediency, signalling heightened awareness of systemic pressures and ethical tensions in technology deployment. Meanwhile, *r/ScienceTeachers* and *r/teachingresources* foregrounded disrupted conceptual continuity, verification-induced stress, and pedagogical depth erosion, which directly informed the sub-thematic categories associated with the disciplinary and instructional challenges of AI integration.

TABLE 2. THE THEMATISATION TRAIL ACCENTUATING THE THEMES, SUB-THEMES, THEMATIC ORIGINS, AND CODING CLUSTERS OF AIPDTS

Major Theme	Sub-Theme	Brief Description of the Sub-Theme	Thematic Origin (Subreddit) and Total Coding Frequency Counts	Coding Cluster of Recurring Thought Elements per Subreddit
<b>Disruptions to Coherent Science Lesson Design</b>	Incongruence Across Science Learning Concepts	This sub-theme reflects how mismatched AI-generated materials across different science topics create confusion, forcing teachers to resolve issues	<i>r/ScienceTeachers</i> (3)	Curricular fragmentation Disrupted conceptual continuity
			<i>r/Teachers</i> (25)	Epistemic misalignment Pedagogical mediation burden

	between lessons and maintain curricular flow.	<i>r/education</i> (16)	Cognitive dissonance in lesson sequencing Unstable curricular reconstruction
		<i>r/edtech</i> (8)	Cross-disciplinary incongruity Pedagogical patchwork
Incongruence Within a Science Learning Concept	This sub-theme captures teachers' struggles with AI tools that produce inconsistent or inaccurate scientific explanations, leading to mental fatigue as they constantly verify and correct flawed information.	<i>r/ScienceTeachers</i> (2)	Internal conceptual distortion Epistemic instability
		<i>r/education</i> (11)	Intratopic contradiction Reliability gap in AI outputs
		<i>r/edtech</i> (5)	Conceptual misrepresentation Verification-induced stress
		<i>r/teachingresources</i> (3)	Pedagogical error correction Threat to disciplinary authenticity
		<i>r/Teachers</i> (25)	Implementation uncertainty Pedagogical role ambiguity
Uncertainties in Science Pedagogical Integration	This sub-theme shows how unclear guidelines and inconsistent AI functions leave teachers uncertain about how to use such tools effectively in real classroom situations.	<i>r/ScienceTeachers</i> (2)	Tool-context dissonance Institutional AI policy vagueness
		<i>r/edtech</i> (3)	Cognitive overload from unclear practices Improvisational teaching strain
		<i>r/education</i> (10)	Undefined professional expectations Structural ambiguity in AI integration
Misalignment with Science Pedagogical Goals	This sub-theme highlights the tension between AI-driven shortcuts and	<i>r/education</i> (11)	Dilution of inquiry-based learning Technological overreach in pedagogy

	the deeper aims of science education, as overreliance on automation weakens students' inquiry and problem-solving habits.	<i>r/edtech</i> (5)	Reduced epistemic engagement
		<i>r/Teachers</i> (9)	Superficial learning due to AI Displacement of critical thinking
		<i>r/ScienceTeachers</i> (2)	Algorithmic dependency Ethical-pedagogical divergence Pedagogical authenticity erosion
<b>Pressures of Efficiency-Propelled Science Instruction</b>	Prioritisation of Performative Speed over Pedagogical Depth	<i>r/teachingresources</i> (2)	Efficiency–integrity paradox Superficial productivity
		<i>r/ScienceTeachers</i> (2)	Temporal pressure in instruction Compromised reflective teaching
		<i>r/edtech</i> (3)	Accelerated task orientation Cognitive bypassing
		<i>r/CSEducation</i> (2)	Pedagogical depth erosion Automation-driven expediency
	Restriction of Teacher Autonomy due to Prescriptive Outputs	<i>r/Teachers</i> (20)	Institutional AI teaching imposition Erosion of professional agency
		<i>r/edtech</i> (2)	Technocentric governance Ethical unease and regulation gap
		<i>r/education</i> (9)	Pedagogical standardisation pressure Resistance to instructional homogenisation

Source: Constructed by the first author

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These recurring codes were then subjected to iterative comparison, collapsing similar descriptors into conceptual clusters that represented the most salient meaning patterns within the dataset. This process produced the six (6) sub-themes, each grounded in an operational definition derived from the coding thought elements. For example, *Incongruence Across Science Learning Concepts* emerged from frequent references to curricular fragmentation, epistemic misalignment, and pedagogical patchwork, encapsulating the ways in which AI-generated content disrupted logical progression across topics. Similarly, *Ambiguities in Science Practical Application* was shaped by repeated mentions of implementation uncertainty, tool-context dissonance, and institutional policy vagueness, signifying the absence of coherent structures to guide AI usage in practical teaching contexts. These sub-themes thus represented the conceptual scaffolds upon which the educators' cognitive and emotional experiences of AI-induced pedagogical designing technostress were systematically interpreted.

Throughout the thematisation process, interpretative rigour was ensured through constant pairwise coder comparison and iterative memoing, enabling the analytic categories to remain faithful to the participants' discursive tone while still achieving conceptual abstraction. Each transition from code to sub-theme, and from sub-theme to major theme, adhered to the QCA principle of balancing manifest meaning (the explicit statements of educators) and latent meaning (the underlying tensions and pedagogical implications). The final thematic structure, therefore, did not merely categorise discourse but interpreted the layered experiences of science educators navigating AI's pedagogical and ethical frontiers, offering both descriptive coherence and theoretical depth.

#### 3.4.3. Additional Vetting Procedure in the Processing of Coded Reddit Commentaries

All authors independently coded the complete dataset of 210 verified Reddit commentaries using a collaboratively developed codebook. To ascertain consistency across the coding process, Cohen's Kappa ( $\kappa$ ) was computed through pairwise coder comparisons for all commentaries. Cohen's  $\kappa$  was employed as the statistical measure of intercoder reliability because it adjusts for the possibility of agreement occurring by chance, making it more rigorous than simple percent agreement. This statistic is particularly appropriate for QCA involving categorical coding decisions.

The analysis yielded Cohen's  $\kappa = 0.863$ , signifying a highly stable level of agreement per established statistical traditions (Landis & Koch, 1977). The observed agreement ( $P_o = 0.886$ ) indicates that the two coders assigned the same sub-theme label to approximately 88.6% of the coded units. This means that in most cases, both coders independently agreed on how to categorize the data. Meanwhile, the expected agreement ( $P_e = 0.164$ ) represents the proportion of agreement that could have occurred by chance. This means that in most cases, any overlap in coding decisions could simply be attributed to random coincidence rather than to a shared interpretation of the coding framework. By comparing these two values, Cohen's  $\kappa$  adjusts the observed agreement to account for agreement that may have arisen randomly. Thus, a high  $P_o$  and a low  $P_e$ , as in this case, indicate that the coders' agreement was systematic, meaningful, and not due to coincidence. Such a transparent, team-based validation process aligned with the methodological expectations of modern-day LCA inquiries, which emphasise coder verification and reliability calibration to reinforce subsequent analytical integrity (Obmerga et al., 2025).

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### 3.5. Ethical Considerations

The study was exempted from formal ethical clearance upon review of Centro Escolar University – Coursework Publications under protocol code PRSE351-SY2025-26-1, as it did not involve direct contact and interaction with human participants. All data were sourced from publicly accessible online Reddit threads available at the time of collection, and no attempts were made to contact, identify, or interact with the individuals behind the usernames. To safeguard anonymity even within the bounds of fair use, any potentially identifying information was excluded from reporting. Norman-Adams (2024) cautions that reverse searching the identities of Reddit contributors using the quotes constitutes a potential ethical violation in data scraping. Hence, to avoid the involuntary identity disclosure of the original posters whose commentaries were presented in the findings, the authors rephrased the quotes, modifying their sentence structures while carefully preserving the literal meaning of the original expressions.

### 3.6. Trustworthiness and Rigour

To ensure the study's trustworthiness and rigour, the authors adhered to the Consolidated Criteria for Reporting Qualitative Research (COREQ) (Tong et al., 2007), concretising methodological transparency and completeness across all analytic stages. The inquiry explicitly conformed to key COREQ parameters, including researcher reflexivity, detailed description of data sources, procedural transparency in coding and thematisation, and explicit articulation of analytic decisions. Credibility was reinforced through full intercoder participation, yielding a Cohen's  $\kappa = 0.863$ , indicative of near-perfect reliability. Transferability was ensured by contextualising each sub-theme with illustrative commentaries that preserve educators-Redditors' intent, while dependability was secured through systematic documentation of coding decisions. For replication and auditability, the actual Python scripts used for automated data scraping (See Appendices A and B) are included in the supplementary materials, reinforcing the study's commitment to reproducibility within the evolving standards of LCA.

## 4. Results and Discussion

The LCA of Reddit commentaries yielded three (3) overarching themes that capture the antecedents of AIPDTS among science educator-Redditors. Disruptions to coherent science lesson design (Theme 1) show how science educators struggle to reconcile AI with disciplinary sequencing, a problem magnified by rigid accountability systems or fragile infrastructures. Uncertainties in science pedagogical integration (Theme 2) reveal that ambiguity and misalignment amplify stress when institutional guidance is absent. However, the triggers differ between industrialised contexts, where policy often outpaces practice, and developing loci, where resources remain uneven. Pressures of efficiency-propelled science instruction (Theme 3) highlight the paradox that while AI promises workload relief, it simultaneously erodes pedagogical depth and teacher autonomy, raising ethical and professional concerns across systems. Collectively, these findings articulate how TS is not simply a technological challenge but a pedagogical and psychological reality that reshapes contemporary science teaching.

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## 4.1. Disruptions to Coherent Science Lesson Design

### 4.1.1. *Incongruence Across Science Learning Concepts (Issues on Lessons' Intercoherence)*

The LCA revealed a recurrent difficulty among international science educators: maintaining lesson intercoherence when integrating AI-generated instructional materials into the design of science lessons. Intercoherence, the logical sequencing and progressive connection of scientific ideas across topics, is central to pedagogical integrity in science, where conceptual knowledge builds cumulatively from simple to complex phenomena (Erdem, 2009). Yet, the data demonstrated that AI outputs often disrupted this structure, producing materials that conflicted with established curricular logics.

As one educator reflected in *r/ScienceTeachers*, “*The difficulty with AI is less about factual inaccuracies and more about the way it combines concepts in a manner that conflicts with how scientific knowledge is conventionally structured. I often find myself spending more time reorganising AI-generated ideas from different science topics than engaging in actual teaching.*” This comment typifies the global frustration among science teachers who find themselves functioning less as designers of learning and more as curators of coherence. Another contributor from the same subreddit affirmed, “*Unlike AI, educators possess the capacity to shape horizontal learning through cross-cutting presentation of topics... guiding students towards authentic understanding even when the process feels less formal.*” An educator on *r/Teachers* echoed this sentiment, emphasising that “*the burden placed on educators to reconcile disjointed or misaligned materials unfairly shifts the workload onto teachers rather than supporting their practice.*”

These accounts illustrate that TS does not merely emerge from technological unfamiliarity but from the epistemic labour required to repair curricular inconsistencies generated by AI. The sensemaking process is mediated by national context. In highly structured educational systems such as the United States (Drost & Levine, 2017), England (Seleznyov, 2020), and Australia (Johnson et al., 2020), where curriculum coherence is strictly monitored, AI misalignments compromise both lesson sequencing and accountability frameworks. Conversely, in developing nations like the Philippines (Lazara & Morales, 2018) and India (Sardana & Muddgal, 2024), where curricular reforms coexist with infrastructural disparities, the same incoherence compounds pre-existing challenges of resource inequity and instructional fragmentation.

From a theoretical standpoint, this disjunction undermines Ausubel’s (2000) theory of meaningful learning, which rests on the gradual assimilation of new knowledge into well-structured cognitive frameworks. When AI-generated materials interrupt the progression of scientific concepts, they risk forming fragmented understandings that crystallise into misconceptions, an outcome particularly concerning in inquiry-based science instruction. One educator in *r/Teachers* captured this risk aptly: “*Overreliance on AI introduces a disconnect between the essential knowledge students are expected to acquire and the content that is ultimately delivered.*”

In sum, this sub-theme demonstrates that AI-induced lesson incoherence manifests as both a pedagogical and psychological strain. It heightens educators’ workload, erodes confidence in algorithmic tools, and undermines the epistemological stability of science curricula. Nevertheless, some teachers transform this strain into professional skill-building—developing adaptive strategies

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to mediate AI inaccuracies, refine curricular links, and reinforce students' conceptual continuity. In this sense, while the antecedent of TS lies in AI-induced disruption, the educators' response embodies a form of reflective resilience that reclaims pedagogical agency.

#### *4.1.2. Incongruence Within a Single Science Learning Concept (Issues on Lesson Intracoherence)*

Science educators also reported significant challenges when AI-generated content conflicted within the boundaries of a single scientific concept, reflecting an intraconceptual incoherence that complicated lesson construction. One science facilitator cautioned, *“Even when limited to supporting a single lesson, AI tools like ChatGPT can still produce inaccuracies that teachers must contend with”* (r/Teachers). Another teacher elaborated with disciplinary precision: *“I sometimes employ AI to generate reading passages in my lesson activities, but close monitoring is essential since its accuracy is not guaranteed. For instance, when asked about the behaviour of water's freezing point under pressures below one atmosphere, the response required verification against a phase diagram”* (r/ScienceTeachers). These excerpts from Reddit commentaries exemplify how educators assume a gatekeeping role: filtering, validating, and recalibrating AI-generated material, to preserve conceptual precision and epistemic reliability within their lessons.

The cognitive and emotional demands associated with these tasks vary according to national and institutional contexts. In technologically advanced countries such as Japan (Lederman et al., 2021) and Germany (Zhai & Pellegrino, 2023), where curricula are anchored in rigorous scientific accuracy and inquiry-based assessment, even minor AI inaccuracies are perceived as professional liabilities, threatening educators' credibility and learners' performance in high-stakes environments. Conversely, in resource-limited contexts such as Nigeria (Onuoha & Chukwueke, 2023) and rural Indonesia (Suparjo et al., 2023), where access to verified instructional materials remains inconsistent, the intrusion of AI inaccuracies compounds existing inequities. As one educator reflected, *“I remain cautious about relying on AI as a lesson development aid, since without thorough review it can introduce inaccuracies and misleading details, particularly in technical science content”* (r/education).

These reflections underscore how AI-induced inconsistencies magnify the cognitive load of lesson preparation. According to cognitive load theory, reconciling contradictions within a concept imposes extraneous demands that drain teachers' working memory, restricting their capacity for more generative tasks such as designing inquiry scaffolds or promoting higher-order reasoning (Hanham et al., 2023). Within the LCA of this study, these tensions manifest as both technical adjustment and pedagogical authenticity issues, where science educators must uphold disciplinary validity even when assisted by imperfect AI tools (Akerson et al., 2014). For many science facilitators, the stress transcends factual correction; it involves safeguarding the epistemic credibility of science teaching (Peffer & Ramezani, 2019). Across both developed and developing educational systems, these dual demands, preserving conceptual accuracy and compensating for AI's shortcomings, amplify educators' cognitive strain and blur the distinction between technological assistance and pedagogical authority. Yet, through these struggles, educators demonstrate adaptive skill development, refining their evaluative judgement, critical literacy, and scientific communication capacities in the face of technological disruption.

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## 4.2. Uncertainties in Science Pedagogical Integration

### 4.2.1. Ambiguities in Science Practical Application

The LCA also revealed a pervasive uncertainty regarding how AI-generated resources should be operationalised in everyday science teaching. As one educator shared, *“A lesson suggestion produced by AI may initially look accurate, yet the application is questionable and prerequisite concepts are omitted, leaving me confused if I will spend more time reorganising and rewriting than actually teaching”* (r/Teachers). Another echoed this concern: *“AI can provide factual content, but it lacks the connective logic that structures ideas; the progression becomes disrupted, and students miss the continuity essential for real application”* (r/Teachers). A third facilitator reinforced this sentiment, noting that *“Science textbooks are structured with a deliberate progression, whereas AI-generated lesson material tends to disregard that logic, producing fragmented content that disrupts students’ skill development and confuses both teachers and students in the end”* (r/Teachers).

These commentaries reveal how science educators increasingly act as curricular interpreters, mediating between the promise of AI-generated materials and the epistemic discipline of science education. Rather than adopting such content uncritically, teachers engage in evaluative reconstruction: reorganising, verifying, and contextualising AI suggestions, to preserve conceptual accuracy and meaningful progression. In this process, however, ambiguity heightens workload and psychological strain. Educators frequently describe shielding learners from the uncertainties embedded in AI outputs, inadvertently reinforcing cognitive offloading, the transfer of mental effort to external tools (Gerlich, 2025), which risks eroding students’ critical thinking and inquiry-based engagement with real-world scientific problems.

This tension manifests differently across global contexts. In Western education systems such as Canada (DeCoito, 2023) and Germany (Petrov, 2021), where technology integration is often rapid and policy-driven, ambiguity arises from the absence of clear institutional frameworks, compelling teachers to improvise pedagogical applications of AI without guidance. Conversely, in contexts such as Brazil (Hendges & dos Santos, 2023) and Vietnam (Nguyen & Pham, 2021), where access to digital infrastructure and teacher training remains uneven, ambiguity deepens as educators must adapt to unreliable technological conditions. One educator summarised this predicament: *“In the absence of AI tools tailored to science lesson realities, teachers are forced to improvise using lacklustre content, often generating more divergence than clarity”* (r/Teachers).

The resulting sense of dislocation aligns with Kahn and associates’ (1964) role ambiguity framework, which posits that unclear expectations generate stress and undermine professional confidence. Within the domain of science education, where structured inquiry and conceptual precision underpin pedagogical assurance, such uncertainty can erode educators’ sense of control and competence (Cairns, 2019). Consequently, science educators in industrialised contexts often interpret ambiguity as institutional misalignment, an outcome of accelerated technological adoption without adequate pedagogical integration, while those in developing systems view it as an extension of enduring structural inequities. Yet amid these tensions, educators display adaptive skill development: they refine their diagnostic judgement, meta-pedagogical awareness, and technological discernment, illustrating a professional resilience that redefines what it means to teach science in an AI-mediated world.

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#### 4.2.2. Misalignment with Science Pedagogical Goals

The LCA also revealed a recurring concern among science educators: AI-generated resources increasingly misalign with the deeper pedagogical goals of science education, where inquiry, perseverance, and conceptual growth are central. As one educator observed, *“Many students now abandon tasks prematurely, turning to AI almost instantly rather than engaging in even brief moments of struggle, which makes authentic perseverance feel increasingly out of reach”* (r/education). Another added, *“Learners carry immediate access to automated solutions in their pockets, making it unrealistic to expect them to consistently resist the temptation to bypass genuine problem-solving”* (r/education). These accounts underscore how habitual dependence on AI erodes productive struggle, a cornerstone of scientific learning. Instead of fostering the habits of mind that underpin scientific literacy, persistence, reasoning, and resilience in uncertainty (Nasr, 2021), students increasingly prioritise efficiency over depth, echoing a growing culture of intellectual shortsightedness.

Such pedagogical displacement threatens long-standing instructional frameworks. For instance, the Next Generation Science Standards (NGSS) in the United States emphasise authentic inquiry, modelling, and argumentation (Ford, 2015), yet educators reported that AI integration often disrupts these ideals by prioritising quick answers over the process of discovery. In response, science facilitators expressed a growing preoccupation with preserving the epistemic integrity of their lessons while simultaneously developing digital discernment skills, balancing the dual responsibility of innovating with technology and safeguarding pedagogical authenticity. One educator summarised this tension aptly: *“The growing emphasis on AI often seems to elevate the tool itself above the central purpose of science pedagogy”* (r/edtech).

In developing nations such as Kenya (Nzomo et al., 2023) and Bangladesh (Talukder et al., 2021), where reform efforts are still transitioning from rote-based methods to inquiry-oriented pedagogies, the challenge is magnified. AI tools, when uncritically used, risk re-entrenching passive learning behaviours rather than enabling active exploration. One teacher reflected, *“Since no AI-detection system is entirely reliable, evaluating each student submission becomes more like investigative work than grading, which leaves teachers feeling drained to recalibrate a future lesson’s structure”* (r/education). This highlights how the burden of technological monitoring falls unevenly on educators, who must divert time from instructional innovation to ensuring authenticity and academic integrity.

From a theoretical perspective, Vygotsky’s (1978) socio-cultural framework underscores why such misalignments are pedagogically significant. Science learning thrives on scaffolded interaction within the learner’s zone of proximal development; AI shortcuts truncate this scaffolding, thereby diminishing both the educator’s instructional agency and the learner’s opportunity for meaningful cognitive struggle (Robertson & Atkins-Elliott, 2020). Consequently, science educators in industrialised contexts experience stress as inquiry traditions are hollowed out by algorithmic convenience, while those in developing systems confront the destabilising effect of stalled pedagogical reform. Yet, across both contexts, educators exhibit adaptive reflexivity, cultivating evaluative judgement, fostering digital ethics, and reaffirming science pedagogy’s enduring mission: to teach not only what to know, but how to think.

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### 4.3. Pressures of Efficiency-Propelled Science Instruction

#### 4.3.1. Prioritisation of Performative Speed Over Pedagogical Depth

The last theme underscored the persistent tension between pedagogical integrity and the efficiency pressures that define modern science teaching. Science educators from varied national contexts acknowledged AI's remarkable utility in reducing cognitive and administrative load, yet simultaneously lamented its erosion of reflective teaching practice. As one educator admitted, *"This year, I began experimenting with an AI tool for planning assessment tasks, and while it was not flawless, it provided a useful starting point so I was not left staring at blank pages late at night"* (r/teachingresources). Another added, *"Written responses, as inputs from students to facilitate lesson planning, are still the most effective way to determine whether learners truly understand and to assess if they are genuinely invested in their learning. However, the process of carefully reading and responding takes considerable time. If AI could meaningfully assist with this task, it would genuinely be transformative"* (r/teachingresources). These reflections reveal that educators recognise AI's potential to ease workload pressures, particularly those linked to lesson design, assessment, and documentation, yet they remain wary of what is lost in the pursuit of speed.

Beneath this appreciation lies a deeper pedagogical unease: the fear that performative speed displaces authentic cognitive engagement. As expressed by a participant, *"AI-generated material often comes packed with facts, yet it lacks the depth or explanatory clarity needed to support real understanding of lessons"* (r/ScienceTeachers). This sentiment reflects a wider professional anxiety: AI facilitates faster task completion but may dilute the very qualities that make science education transformative: conceptual coherence, inquiry, and sustained reasoning. Across educational contexts, this dynamic manifests differently. In high-income countries such as the United States (Sutcher et al., 2019) and the United Kingdom (Johnson & Coleman, 2025), AI appears to offer respite from excessive administrative burdens and teacher shortages but simultaneously risks eroding inquiry-based approaches that underpin science literacy. In contrast, in developing contexts such as Kenya (Otieno et al., 2025) and Pakistan (Hussain et al., 2023), where class sizes are large and resources scarce, efficiency gains are valued but remain offset by the danger of superficial learning, a condition wherein speed masks shallow comprehension.

This paradox resonates with Postman's (1992) critique of technopoly, where efficiency-driven technologies displace deeper educational and cultural values. Similarly, Bruner (1960) posited that meaningful learning arises not from rapid information processing but from grappling with underlying principles through active exploration. The Reddit commentaries illustrate how educators internalise this conflict, describing an affective form of TS that stems less from the tools themselves than from the institutional expectation to do more, faster. One science facilitator warned, *"Relying on AI for instant answers risks undermining productive struggle, leaving students with superficial understanding rather than genuine cognitive growth"* (r/edtech). Another observed, *"Some students are now adept at polishing AI-generated work to make it appear authentically their own, which sidelines the deliberate and often demanding process of genuine scientific learning"* (r/edtech).

Ultimately, the pressures of efficiency-propelled instruction compel science educators to negotiate between two competing imperatives: sustaining humanistic, inquiry-rich pedagogies, and surviving within performance-oriented educational systems that cherish quick output over depth. From a TS

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perspective, the strain emerges not merely from increased workload, but from the existential dissonance between speed and substance, a collision that challenges the professional identity of science educators and redefines what it means to teach well in the age of AI.

#### *4.3.2. Restriction of Teacher Autonomy due to Prescriptive Outputs*

Finally, the science educators emphasised that, at times, the TS they experience did not originate from AI itself, but from how its adoption is enforced. One educator remarked, “*When I voiced concerns about our workload, I was immediately asked, ‘Why aren’t you using AI?’ , as though its use were mandatory*” (r/Teachers), revealing how managerial expectations often frame AI as a default solution rather than an optional tool. Another reflected, “*Professional development on AI often leaves us drained because it rarely translates into real classroom help*” (r/edtech). These accounts show how institutional directives, though well-intentioned, can reduce professional discretion to compliance.

Freire’s (2000) critique of banking education aptly captures this dilemma: when educators are positioned merely as implementers of prescribed content or tools, authentic teaching agency is lost. Similarly, Selwyn (2016) argues that education technology policies often prioritise institutional efficiency over meaningful pedagogy, reinforcing hierarchical control. In such cases, science facilitators’ autonomy, crucial for adapting lessons to context and inquiry-based goals, is constrained, heightening their sense of stress and disempowerment.

This phenomenon varies globally. In the United States, accountability systems equate technology use with innovation (Bush-Mecenas, 2022), while in China, top-down mandates limit contextual flexibility (Luo & Hsiao-Chin, 2023). In resource-limited contexts like the Philippines (Estrellado & Miranda, 2023) and South Africa (Funda & Mbangeleli, 2024), mandatory AI training often fails to address classroom realities. As one teacher warned, “*AI tools feel unreliable. One day they help, the next they confuse*” (r/edtech). From the lens of self-determination theory (Ryan & Deci, 2000), autonomy is essential for motivation and well-being. When educators are pressured to conform to prescriptive AI norms, stress and ethical unease escalate. Many teachers advocate clearer ethical frameworks that safeguard academic freedom and regulate AI bias. Mitigating these challenges calls for participatory policymaking, one that empowers educators to integrate AI adaptively, rather than coercively, into their PD.

## **5. The Researchers’ Reflexivity**

The researchers acknowledged the potential for confirmation bias, as the use of conceptually predefined search terms in the scraping process could have drawn more comments from educators already experiencing heightened AI-related challenges; however, these terms were purposefully guided by the study’s theoretical framework to ensure conceptual alignment and analytical consistency. To mitigate other concerns, reflexivity was practised throughout the LCA by constantly reflecting on personal assumptions and analytic decisions. Several safeguards were applied: both researchers jointly coded the dataset, compared interpretations, and discussed differing views until agreement was reached; comments were read in their full thread context to avoid misinterpretation; and opposing views were intentionally included to balance emerging patterns. The researchers also kept reflexive notes to track how their insights evolved during analysis. While recognising that Reddit users tend to be more expressive about difficulties, the researchers treated this as valuable context rather than bias, interpreting the findings with caution and transparency.

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## 6. Conclusion

Reddit, often revered as “the front page of the internet” (Norman-Adams, 2024, p. 48), provided a rich and dynamic source of discussions for examining the lived experiences of international science educators navigating the antecedents of AIPDTS. The findings revealed three (3) interlocking sources of the novel AI-propelled lesson-related strain being experienced by science educators far and wide. Theme 1 illuminates the disruptions to coherent lesson design, showing how AI destabilises the sequencing and interconnection of scientific concepts, compelling educators to balance disciplinary integrity with technological inconsistency. Theme 2 exposes the uncertainties in science pedagogical integration, demonstrating that in the absence of clear institutional direction, educators waver between cautious experimentation and professional disillusionment, particularly across unevenly resourced contexts. Theme 3 highlights the pressures of efficiency-propelled science instruction, capturing the paradox wherein AI offers workload relief yet simultaneously diminishes pedagogical depth and undermines teacher autonomy. The study’s theoretical contributions, practical implications, limitations, and future research directions are discussed below:

### 6.1. Theoretical Contributions

This research offers three (3) significant theoretical contributions. First, it advances TS-related inquiries by situating them within the discipline-specific demands of science education. In contrast, most prior studies have been confined to the context of general education (Bourlakis et al., 2023), healthcare (Issa et al., 2024; Liṭan, 2025), and corporate work behaviours (Zhang et al., 2025). Second, it contributes to the emerging scholarship on AI in science education by positioning pedagogical design, not merely technological adoption, as the critical locus of analysis, marking one of the pioneering efforts to establish the nexus between AI and instructional planning modality. Third, by drawing on perspectives from international science educators, through Reddit commentaries, in both industrialised and developing contexts, the study contributes to a more nuanced understanding of stressors amidst the ongoing AI-borne paradigmatic shifts in science education, illustrating how efficiency-driven technologies intersect with differing systemic realities yet converge in producing similar strains on science educators’ epistemic and ethical responsibilities in PD.

### 6.2. Practical Implications

The present inquiry yields three (3) practical implications of direct relevance to science education; each purposively anchored from the emerged sub-themes. First, in light of the *Ambiguities in Science Practical Application* and *Misalignment with Science Pedagogical Goals*, educational institutions should design targeted capacity-building programmes that train science educators to critically evaluate AI-generated instructional outputs, aligning them with curricular logic and disciplinary sequencing. Policy frameworks must therefore articulate explicit operational guidelines that clarify the extent, purpose, and boundaries of AI utilisation in science teaching, supported by sufficient technological infrastructure and continuous pedagogical upskilling. Second, echoing the sub-themes of *Prioritisation of Performative Speed over Pedagogical Depth* and *Uncertainties in Science Pedagogical Integration*, teacher preparation institutions should develop professional learning initiatives that foreground AI literacy through inquiry-based and reflective models. Such initiatives must ensure that efficiency-driven teaching does not compromise the cultivation of scientific habits of mind: perseverance, critical inquiry, and evidence-based reasoning, that

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underpin meaningful science learning. Third, consistent with the sub-theme *Restriction of Teacher Autonomy due to Prescriptive Outputs*, educational institutions are urged to safeguard teachers' professional discretion by adopting participatory policy-making protocols. These mechanisms should allow science teachers to co-define how AI is integrated into classroom practice, preventing externally imposed technological mandates from diminishing autonomy or exacerbating technostress. Collectively, these implications emphasise that sustainable AI integration in science education requires institutional clarity, professional empowerment, and pedagogical balance between innovation and intellectual integrity.

### **6.3. Limitations**

While this inquiry offers valuable insights, several limitations must be acknowledged. Since the study relies on Reddit data, the findings are based on voluntary and anonymous contributions, which may not adequately represent the broader population of basic and higher education science educators, may reflect imbalances across Western and Eastern cultural orientations, and pose challenges in verifying the identities of contributors. Yet, Reddit also functions as a window into unfiltered professional discourse, and its role as a form of “passive data collection” (Rocha-Silva et al., 2024, p. 455) offers access to candid reflections often absent from formal interviews. Moreover, the LCA provided systematic breadth, and while this involved some trade-off with contextual depth, it strengthened the capacity to capture wider trends across the dataset without losing sight of directions for more nuanced inquiry. Finally, it should be disclosed that AIPDTS is an original terminology coined and advanced by the authors and not yet a fully established construct in the literature. These limitations are mitigated by verification procedures, analytic transparency, and the study's exploratory intent, positioning the findings as provisional yet generative insights that warrant further empirical scrutiny across contexts and methodologies.

### **6.4. Future Research Directions**

Future scholars are hereby encouraged to deepen and broaden the discourse on AIPDTS by exploring complementary methodological, theoretical, and empirical pathways that extend the present inquiry. On the qualitative front, digital autoethnography could provide first-hand narratives of how science educators navigate TS in their daily AIPD, revealing the lived and situated negotiations that remain inaccessible in Reddit-based analyses. Likewise, Glaserian grounded theory may be employed to theorise the iterative processes through which educators recognise, resist, and reframe AI-induced pressures, thereby capturing the evolving nature of adaptation and resilience in professional practice. Quantitatively, there is a compelling need to develop and validate psychometric tools specifically tailored to measure constructs of TS within AI-integrated science teaching contexts, ensuring that such measures are sensitive to cultural and contextual variations. To strengthen generalisability, subsequent inquiries should transcend the linguistic and cultural homogeneity of Reddit data by incorporating multilingual corpora and educator narratives from diverse educational systems and sociocultural settings. For direct replication efforts of the study, interested scholars who wish to conduct parallel inquiries may refer to the actual Python-assisted data scraping codes provided in the Appendices. They are encouraged to enrich the code to accommodate additional platforms, languages, or filtering parameters reflective of their local educational contexts and research foci. Doing so will not only strengthen methodological transparency and reproducibility but also enhance the intercultural validity and scalability of future AIPDTS investigations. Lastly, expanding the scope to include multiple online and offline data

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sources, such as Twitter/X, teacher blogs, professional learning communities, and institutional repositories, could offer a richer comparative lens.

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## **Declaration Statements**

### **Conflict of Interest**

There are no potential conflicts of interest in relation to the publication of this work.

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### **Data Availability**

Data supporting the conclusions of this study can be made available upon reasonable request from the corresponding author.

### **AI Use**

The authors declare that any use of artificial intelligence tools in the preparation of this manuscript was limited to technical or language support, including the verification of the correctness and completeness of Python codes, and is transparently disclosed. The authors further affirm that all cited sources are real, accurately referenced, and have been verified by the authors. Full responsibility for the content and integrity of this article remains with the authors.

### **Ethics Statement**

For studies involving human participants, the authors confirm that the research complied with relevant institutional and national ethical standards. Ethical approval was obtained where required, and informed consent was secured from all participants prior to data collection. If ethical approval was not required, the authors confirm that the study adhered to applicable ethical guidelines.

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## Appendix A: The First Wave of Python-assisted Data Scraping Code/Script

```
import praw
import datetime

# --- Your Reddit credentials ---
reddit = praw.Reddit(
    client_id="REDACTED [TO INSERT YOUR OWN REDDIT CREDENTIALS]",
    client_secret="REDACTED [TO INSERT YOUR OWN REDDIT CREDENTIALS]",
    user_agent="AI_ScienceTeaching_Scraper"
)

# --- Search term ---
search_term = "artificial intelligence"

# --- Subreddits to check ---
subreddits = [
    "ScienceTeachers",
    "ScienceEducation",
    "PhysicsTeachers",
    "ChemistryTeachers",
    "Teachers",
    "EdTech",
    "AcademicTechnology"
]

# --- Storage ---
results = []

for sub in subreddits:
    print(f"\n Searching in r/{sub}...")
    subreddit = reddit.subreddit(sub)

    try:
        # safer search with error handling
        for submission in subreddit.search(search_term, limit=10, sort="new"):
            print(f"    Post: {submission.title} ({submission.url})"

                submission.comments.replace_more(limit=0)
                for comment in submission.comments.list():
                    comment_date = datetime.datetime.fromtimestamp(comment.created_utc)
                    results.append({
                        "subreddit": sub,
                        "post_title": submission.title,
                        "post_url": submission.url,
                        "comment": comment.body,
                        "date": comment_date.strftime("%Y-%m-%d %H:%M:%S")
                    })

    except Exception as e:
        print(f"    Skipped r/{sub} due to error: {e}")

# --- Output ---
print("\n Finished extracting comments!")
print(f"Total extracted comments: {len(results)}")

with open("ai_science_comments_with_date.txt", "w", encoding="utf-8") as f:
    for r in results:
        f.write(f"[{r['subreddit']}] {r['post_title']} ({r['post_url']})\n")
        f.write(f"Date: {r['date']}\n")
        f.write(f"Comment: {r['comment']}\n\n")
```

## Appendix B: The Second Wave of Python-assisted Data Scraping Code/Script

```
import pandas as pd
import re

# === SETTINGS ===
CSV_FILE = "reddit_ai_teaching.csv"      # input CSV (must be on Desktop with this script)
OUTPUT_FILE = "ai_technostress.csv"     # output CSV with filtered comments

# === STEP 1: LOAD CSV ===
try:
    df = pd.read_csv(CSV_FILE, encoding="utf-8")
except UnicodeDecodeError:
    df = pd.read_csv(CSV_FILE, encoding="latin-1")

print(f"\n Loaded file with {len(df)} rows")
print(" Columns found:", df.columns.tolist())

# Make sure we have the right column
if "comment" not in df.columns:
    raise ValueError(" ERROR: No 'comment' column found in the CSV. Please check column names.")

# === STEP 2: DEFINE NEGATIVE AI TERMS ===
negative_terms = [
    "stress", "overload", "burnout",
    "fatigue", "strain", "pressure", "anxiety",
    "imbalance"
]

# Allow both "AI" and "Artificial Intelligence"
pattern_ai = r"(?:\bai\b|artificial[\s\-\-]*intelligence)"

# Build regex patterns (both orders: AI → term, term → AI)
patterns = []
for term in negative_terms:
    t = re.escape(term)
    patterns.append(re.compile(fr"{pattern_ai}({t})", re.IGNORECASE))
    patterns.append(re.compile(fr"({t}){pattern_ai}", re.IGNORECASE))

# === STEP 3: FILTER FUNCTION ===
def is_ai_stress(text):
    text = str(text).lower()
    return any(p.search(text) for p in patterns)

df["related"] = df["comment"].apply(is_ai_stress)

# === STEP 4: SPLIT DATA ===
related = df[df["related"] == True]
excluded = df[df["related"] == False]

# === STEP 5: SAVE OUTPUT ===
related.to_csv(OUTPUT_FILE, index=False, encoding="utf-8-sig")

# === STEP 6: SUMMARY ===
print("\n AI-Related Technostress Analysis")
print(f"   Total comments: {len(df)}")
print(f"   Related to AI stress: {len(related)}")
print(f"   Not related: {len(excluded)}")

if "subreddit" in df.columns:
    print("\n Breakdown by subreddit (related only):")
    print(related["subreddit"].value_counts())

print("\n Sample related comments:\n")
for i, row in related.head(10).iterrows():
    print(f"- {row['comment'][:200]}...\n")

print(f" Saved results to: {OUTPUT_FILE}")
```

# GILE Journal of Skills Development

## Design Thinking-Driven Policy Imperatives for the Curricular Integration of PISA 2029's MAIL Competency in Filipino In-Service Teacher Training

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### Abstract

In the Philippine educational context, In-Service Teacher Training (INSET) remains central to teacher professional development and to sustaining educational reforms. As technological innovations—particularly artificial intelligence (AI)—reshape teaching and learning, teachers face increasing pressure to integrate AI and media tools in ways that are meaningful, ethical, and pedagogically sound. However, many existing INSET programmes continue to prioritise tool-based demonstrations rather than structured and reflective pedagogical practice, while challenges such as the digital divide, limited infrastructure, and unequal access to technology constrain responsible implementation. This descriptive-exploratory study examines how integrating Design Thinking (DT) and Media and Artificial Intelligence Literacy (MAIL)

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within INSET can strengthen teachers' capacity to respond to these challenges while aligning professional development with international benchmarks such as the Programme for International Student Assessment (PISA) 2029 framework. The paper develops a conceptual framework illustrating how DT-informed INSET can operationalise MAIL competencies through practices such as ethical reflection, bias evaluation, iterative prototyping, peer feedback, and stakeholder validation. The analysis also considers feasibility factors including institutional readiness, technological resources, and sustainability requirements. By strengthening teachers' capacity to integrate ethical AI use, media evaluation, and human-centred problem solving into classroom practice, the proposed DT–MAIL–informed INSET approach functions as a skills multiplier that supports learners' development of critical thinking, ethical reasoning, digital literacy, adaptability, and other future-ready competencies.

**Keywords:** In-Service Teacher Training, PISA 2029, AI literacy, media literacy, design thinking

## 1. Introduction

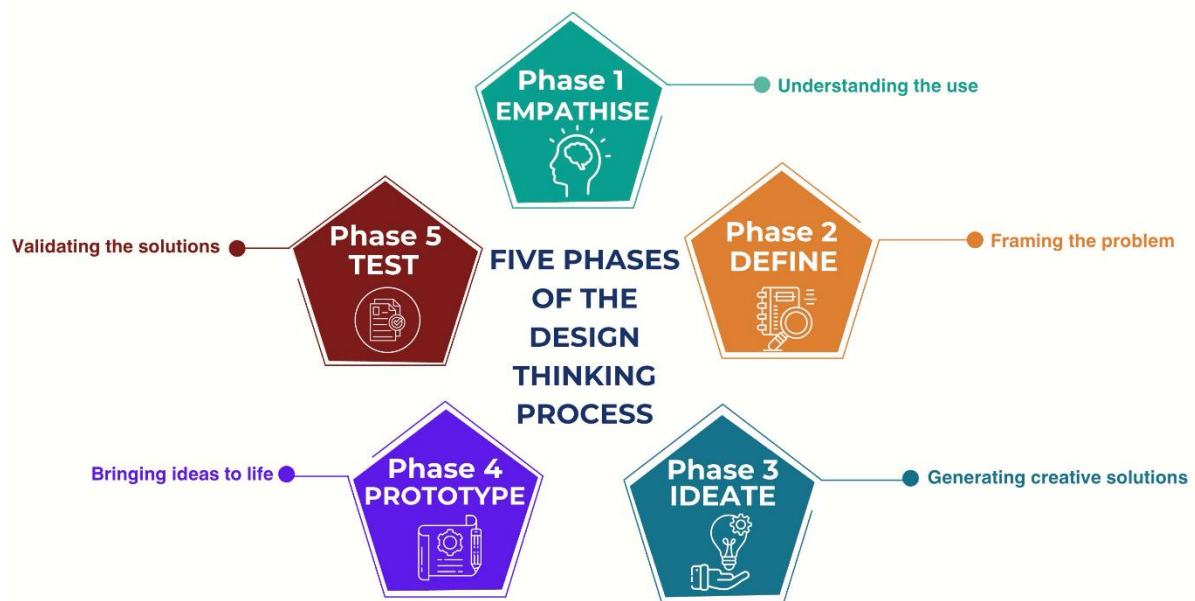
The educational sector continues to shift from traditional, prescriptive models of in-service teacher capacity-building toward more adaptive, dynamic, and competency-oriented professional learning ecosystems (Rivera et al., 2025). Among emerging paradigms, Design Thinking (DT) has gained prominence as a human-centred and context-responsive approach that positions teachers as reflective innovators capable of empathising with learners' needs, iterating pedagogical solutions, and fostering creativity within instructional practice (Baran & AlZoubi, 2023). However, the accelerating technological demands of the 21st century require teachers not only to cultivate these human-centred dispositions but also to develop the competencies necessary to navigate profound digital transformations reshaping education.

The growing discourse on the suite of literacies educators must possess has prompted the Programme for International Student Assessment (PISA) to introduce Media and Artificial Intelligence Literacy (MAIL) as a new assessment domain for its 2029 cycle, underscoring the urgency of preparing learners for an AI-mediated world. Recent studies highlight that teacher AI literacy is critical for effective MAIL integration, showing that structured professional development improves teachers' conceptual understanding, pedagogical application, and readiness to implement AI-mediated learning experiences (Deshen et al., 2026; Kim et. al, 2025; Zhao & Huang, 2025). While this direction is future-oriented, it presupposes that educators themselves possess the conceptual depth, operational understanding, and pedagogical readiness needed to enact these competencies meaningfully in classroom contexts. As INSET remains the primary mechanism for sustained professional development, this paper argues that INSET curricula must intentionally integrate DT and MAIL. Embedding this intersection within INSET design provides a policy-relevant pathway for cultivating digitally fluent, pedagogically agile, and future-ready Filipino educators capable of leading transformative learning in an AI-driven era. While this paper focuses on in-service teacher training as a policy entry point, its primary contribution lies in strengthening skills development outcomes for young people and early-career learners. Teachers are framed as skill multipliers whose pedagogical practices directly shape students' readiness for ethical digital participation, employability, and lifelong learning in an AI-mediated society. Reframing INSET through a Design Thinking and Media and Artificial Intelligence Literacy lens therefore links professional development reform to concrete learner skill outcomes rather than institutional change alone.

## 2. Design Thinking as a Springboard for Policy Advancements

Design Thinking (DT) is commonly defined as an iterative, creative, and user-responsive approach to problem-solving that emphasises understanding authentic needs, generating ideas, and refining solutions through continuous testing (Brown, 2008). This approach provides a structured yet flexible framework that supports innovation in complex and rapidly evolving educational environments. The five phases of the DT process—Empathise, Define, Ideate, Prototype, and Test—illustrate this cyclical and reflective methodology (see Figure 1).

FIGURE 1. THE FIVE PHASES OF THE DESIGN THINKING PROCESS



Source: original work of the authors, based on Brown (2008)

Expanding on this view, Obmerga (2020) characterises DT as a creative, human-centred method that cultivates key dispositions such as grit, empathy, and innovation among educational practitioners. Its relevance in education continues to grow due to its alignment with 21st century skills and global competencies, including metacognition, adaptability, innovation, and lifelong learning, positioning DT as a solid foundation for curriculum enhancement and policy reform.

Taken together, these perspectives underscore DT as both a mindset and a process essential to educational innovation, particularly in preparing teachers for emerging domains such as media and AI literacy under PISA 2029. As shown in Table 1, each phase of the DT model plays a distinct role in instructional and curricular design. When enacted through classroom practice, Design Thinking also functions as a mechanism for cultivating transferable learner skills, including creativity, collaboration, communication, and problem-solving. By embedding DT within INSET, teachers are better equipped to design learning experiences that mirror real-world innovation processes, thereby strengthening students' preparedness for early-career trajectories and future workplace demands.

TABLE 1. PHASES OF THE DESIGN THINKING MODEL IN INSTRUCTIONAL AND CURRICULAR DESIGN

Phases of DT	Instructional and Curricular Design
Empathise	The first stage focuses on understanding learners’ needs, contexts, and challenges. Empathy ensures that solutions are grounded in authentic realities rather than abstract assumptions. Research shows that empathy-driven inquiry enhances inclusivity and contextual relevance in higher education.
Define	Insights gathered from empathy are synthesised into clear problem statements. Effective problem framing through “How might we...?” questions ensure that solutions are actionable and aligned with educational challenges.
Ideate	Teachers and policymakers brainstorm multiple creative possibilities without prematurely judging ideas. Ideation fosters divergent thinking, which has been shown to strengthen collaboration and creativity in virtual classrooms.
Prototype	Ideas are transformed into tangible models or lesson designs that can be assessed in practice. A qualitative study of science teachers as resource writers found that prototyping enhanced creativity and iterative improvement in instructional materials.
Test	Prototypes are evaluated with real users to gather feedback. Testing is iterative, focusing on refinement rather than validation. Evidence from curricular design shows that design-thinking-based lessons significantly improve student engagement and competency development.

Source: own compilation of the authors based on the works of Alima et al. (2024), Alvarado (2025), Capili & Saludez (2024), Fitriyah et al. (2025), and Ramos & Inocian (2022)

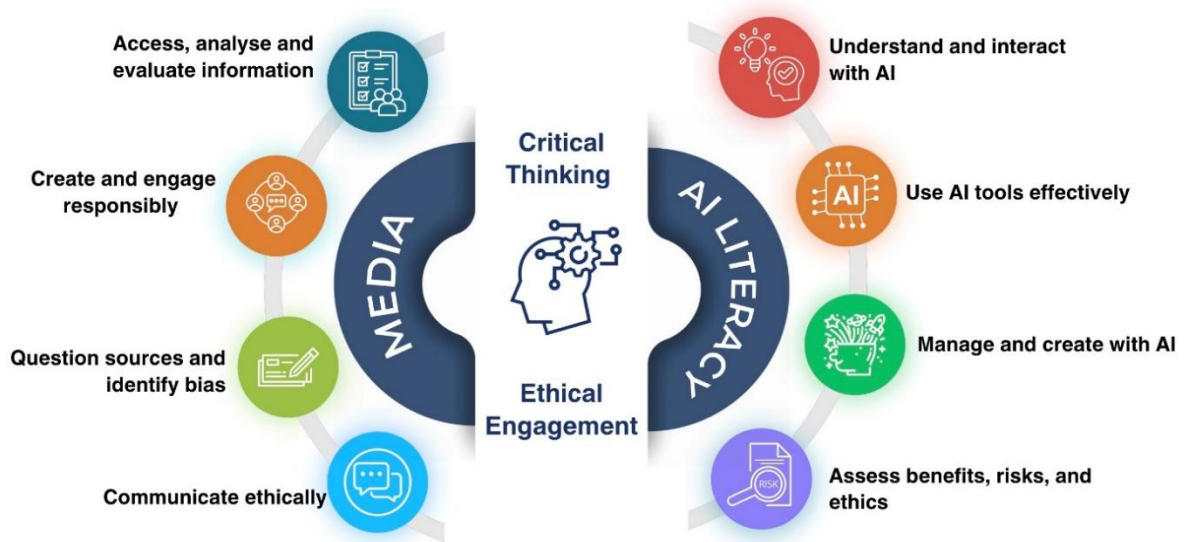
### 3. PISA 2029’s New Assessment Domain, Media and AI Literacy (MAIL)

Rapid technological advancement has positioned AI as an integral component of contemporary education. Integrating AI into learning competencies is essential to preparing students for participation in an AI-driven society. In response, the Organisation for Economic Co-operation and Development (OECD) introduced Media and Artificial Intelligence Literacy (MAIL) as a new assessment domain in PISA 2029 (see Figure 2). This domain emphasises learners’ capacity to think critically, act ethically, and engage responsibly with media and AI technologies (Wong, 2025).

Effective implementation of MAIL requires that teachers themselves possess the necessary knowledge, skills, and pedagogical strategies to integrate these competencies into classroom practice. As part of DT-driven policy imperatives, targeted INSET initiatives are essential to build teacher capacity for MAIL integration. While the OECD establishes the global framework for PISA 2029, the Southeast Asian Ministers of Education Organisation (SEAMEO) supports regional implementation by assisting member countries in contextualising teacher training and curriculum alignment in this emerging domain (Wong, 2025).

FIGURE 2. BEYOND READING AND MATH: PISA 2029 ADDS MEDIA AND AI LITERACY

## Media + AI Literacy = MAIL



Source: original work of the authors, based on Wong (2025)

Table 2 aligns the MAIL competency framework with corresponding INSET priorities to ensure that teacher professional development directly supports classroom readiness for PISA 2029.

TABLE 2. MAIL COMPETENCY FRAMEWORK ALIGNED WITH IN-SERVICE TEACHER TRAINING NEEDS

MAIL Competency Area (PISA 2029)	OECD/SEAMEO Description	In-Service Teacher Training Implications
Understanding how digital & AI tools work	Learners understand how digital and AI tools function, including their capabilities, limitations, and mechanisms.	Training on AI fundamentals (algorithms, machine learning, generative AI)
Understanding the human role in digital tools & media	Learners recognise how people design, shape, and are affected by digital systems, platforms, and media.	Ability to explain AI-driven features in educational platforms
Social & ethical consequences of digital/AI use	Learners reflect on ethical concerns, including bias, privacy, surveillance, manipulation, and societal impact.	Skills to identify potential misuse and risks of AI within the classroom
Communicate & collaborate effectively using digital/AI tools	Learners engage productively, responsibly, and collaboratively using digital and AI-mediated platforms.	Knowledge of human-centred factors behind algorithms, data flows, platform design, and content moderation
Critically evaluate media content	Learners analyse AI-generated and human-generated media for credibility, intent, bias, and reliability.	Ability to teach students about data sovereignty, platform influence, and user agency

Source: own compilation of the authors based on the works of Alima et al. (2024), Alvarado (2025), Capili & Saludez (2024), Fitriyah et al. (2025), and Ramos & Inocian (2022)

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Although MAIL is operationalised through teacher professional development, its intended impact is realised at the learner level. Teachers trained in MAIL translate ethical AI use, media credibility evaluation, and responsible digital engagement into classroom practices that directly shape students' future skills, including digital judgment, critical media analysis, and AI-aware decision-making essential for early-career participation in technology-rich environments

#### **4. Evidence Base and Policy Context**

This section synthesises key research on Philippine INSET, highlighting current practices, demonstrated impacts, and persistent gaps in integrating Design Thinking and Media and Artificial Intelligence Literacy. The evidence provides a foundation for identifying priority areas and informing targeted, practice-oriented INSET reforms.

##### **4.1. The Nature and Dynamics of In-Service Teacher Training (INSET)**

INSET and teacher professional development are consistently linked to teaching quality and student outcomes; however, their impact is constrained by access gaps, funding inconsistencies, and limited alignment with evolving pedagogies. Philippine studies highlight inequitable participation in INSET due to logistical and structural barriers (Rivera et al., 2025). At the classroom level, initiatives embedding DT demonstrate measurable gains in 21st-century competencies when teachers operationalise empathise–define–ideate–prototype–test cycles in instruction (Ramos & Inocian, 2022).

Science teachers engaged as learning resource writers further report that DT fosters user-centredness, iterative improvement, and creativity, though sustained practice requires clearer pedagogical framing and targeted capacity building (Capili & Saludez, 2024). Collectively, these findings suggest that Philippine INSET must shift from brief, centralised, and decontextualised offerings toward continuous, school-embedded, and DT-aligned professional learning pathways that explicitly cultivate MAIL competencies.

These findings indicate that strengthening INSET through DT-aligned approaches not only enhances teacher capacity but also generates downstream gains in students' 21st-century skills, reinforcing professional development as a lever for youth skills formations.

##### **4.2. The Conduct of Filipino INSET at a Glance**

Philippine INSET remains characterised by short duration, centralised delivery, and weak integration with classroom practice, limiting transfer and instructional relevance (Rivera et al., 2025). Despite needs assessments and available learning opportunities, outcomes are often constrained by unequal access to digital infrastructure and misalignment with contemporary competency demands. As a result, teacher learning frequently remains at the level of awareness rather than sustained pedagogical transformation.

Nonetheless, local studies demonstrate that DT-aligned pedagogies are both feasible and impactful in public school contexts. Virtual DT interventions in social studies improved critical thinking, communication, collaboration, and creativity (Ramos & Inocian, 2022); DT-guided science resource writing enhanced user-centred instructional design (Capili & Saludez, 2024); and DT-based science lessons produced significant gains in learning outcomes and prototype quality (Alima et al., 2024). These findings offer practical models for INSET reform grounded in localised DT application.

### 4.3. Challenges and Gaps in the Philippine INSET

Despite progress, persistent gaps remain in integrating Media and Artificial Intelligence Literacy within Philippine INSET. Studies indicate that teachers are underprepared to address critical thinking, misinformation, and ethical challenges due to limited pedagogical preparation in media and information literacy (Carambas & Tibaldo, 2025). Systemic barriers—including unequal access to technology, discontinuity of institutional support, and insufficient mechanisms for classroom application—further constrain effective implementation (Rivera et al., 2025).

These challenges are compounded by evidence that media and information literacy instruction in senior high schools often lacks depth, coherence, and sustained support (Bautista, 2021). Together, these findings underscore the need for INSET policies that are coherent, accessible, and firmly grounded in classroom practice to meaningfully strengthen teachers’ Media and Artificial Intelligence Literacy capacities.

## 5. Key Policy Gaps

Department of Education (DepEd) INSET memos (2020–2026) consistently lack MAIL and DT in both national and Schools Division Office (SDO)-level programmes. Training priorities centre on literacy, numeracy, leadership, and digital tools, but sessions on platforms like Open Educational Resources (OER), Canva, and M365 remain tool-focused, offering demonstrations rather than deeper engagement with AI reasoning, media analysis, misinformation, digital ethics, or structured innovation processes. Monitoring and evaluation exclude MAIL and DT indicators, and professional development resources provide no future-ready packages. This systemic gap leaves teachers unprepared for global benchmarks such as PISA 2029, which requires competencies in AI reasoning, media evaluation, creative problem-solving, and design thinking.

Table 3 shows INSET topics from SY 2020–2026 and their alignment with PISA 2029 skills. Across these years, structured MAIL and DT modules are absent. While some programmes introduced digital tools and creative strategies, these were scattered and lacked formal integration, limiting their impact on PISA readiness. Findings underscore the urgent need to embed AI literacy, media literacy, and design thinking into INSET at both national and SDO levels.

TABLE 3. DEPED INSET POLICY REFERENCES: MAIL/DT INTEGRATION (2020–2026)

School Year / Policy Reference	Key Topics / Target Participants / Design Thinking & MAIL Content
2020–2021 (DepEd Memo 081 s. 2020)	<p><i>Key Topics:</i> Curriculum challenges; learning delivery modalities; classroom assessment; learning resources; DepEd TV / satellite / multimodal platforms</p> <p><i>Target Participants:</i> Teachers (all levels)</p> <p><i>Design Thinking &amp; MAIL content:</i> No design thinking or structured innovation; No explicit media or AI literacy training</p>
2021–2022 (OUA Memo 00-0821-0073)	<p><i>Key Topics:</i> OER; email etiquette; copyright; Canva for performance tasks; virtual delivery; radio/TV-based instruction; creative strategies; device awareness; Minecraft Education; video/app development; cyberbullying; Internet safety; Google PD</p>

	<p><i>Target Participants:</i> Teachers, IT Coordinators, School Admin</p> <p><i>Design Thinking &amp; MAIL Content:</i> Creative tools used, but there was no structured design thinking process; Digital literacy topics appear, but no deep AI literacy</p>
2023–2024 (DM-OUHROD-2024-0037)	<p><i>Key Topics:</i> Higher Order Thinking Skills Professional Learning Packages (HOTS-PLP) (Eng/Math/Sci); Instructional Leadership; Microsoft 365; National Reading &amp; Math Programmes; Learning Camp; English Language, Literacy, and Numeracy (ELLN); Curriculum, Supervision, and Evaluation (CSE) guidelines; Child Rights &amp; Protection; Safe Spaces Act</p> <p><i>Target Participants:</i> Teachers, School Heads, Supervisors</p> <p><i>Design Thinking &amp; MAIL content:</i> HOTS is present but not design thinking; No media/AI literacy component</p>
2024–2025 (DM-OUHROD-2024-2306)	<p><i>Key Topics:</i> Same focus areas as 2023–2024 INSET (HOTS-PLP, Instructional Leadership Training (ILT), Microsoft 365, literacy/numeracy programmes, policy guidelines)</p> <p><i>Target Participants:</i> Teachers, School Leaders</p> <p><i>Design Thinking &amp; MAIL content:</i> No design thinking elements noted; No explicit MAIL or AI literacy</p>
2025–2026 (DM-OULS-2025-095 – Guidelines)	<p><i>Key Topics:</i> Reflective practice (Revised K–12); ARAL–Reading; inclusive instruction; literacy/numeracy strategies; critical &amp; creative thinking; Social and Emotional Learning (SEL); flexible modalities; digital adoption; Alternative Learning System (ALS) instruction; enhanced guidance services</p> <p><i>Target Participants:</i> Teachers; Guidance Staff</p> <p><i>Design Thinking &amp; MAIL content:</i> Critical/creative thinking present, but no explicit design thinking model; Digital adoption mentioned, but AI literacy undefined</p>

Source: own compilation of the authors based on Department of Education, 2020; Department of Education Schools Division Office Dasmariñas City, 2021; Office of the Undersecretary for Human Resource and Organizational Development, 2023, 2024; Office of the Undersecretary for Learning Support, 2025

INSET priorities have gradually improved but still show persistent gaps. Early cycles focused on delivery logistics, offering limited relevance to future-ready skills. Later years introduced digital tools and higher-order thinking (HOTS) for critical thinking, yet approaches remained tool-centric without structured DT or AI readiness training. The latest cycle added creative thinking and digital adaptation but lacked operational clarity and systematic innovation. Overall, while themes increasingly reflect PISA 2029 competencies, MAIL and DT remain missing, leaving teachers underprepared for next generation learning demands.

## 6. Policy Recommendations

The proposed policy recommendations are anchored on the intersection of DT and MAIL—a framework that combines human-centred innovation with future-ready digital competencies.

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By aligning the five DT phases (Empathise, Define, Ideate, Prototype, and Test) with MAIL skills, INSET can move beyond tool-based demonstrations toward practical, ethical, and context-sensitive teacher development. This DT × MAIL approach, embedded in the curricular design of the INSET, ensures that training addresses real classroom challenges, promotes responsible AI and media use, and equips teachers to meet global benchmarks like PISA 2029 while remaining grounded in Philippine educational realities.

Collectively, these recommendations are designed to ensure that improvements in teacher capacity translate into measurable skills development outcomes for learners, particularly in relation to ethical AI use, critical media engagement, and employability-relevant competencies aligned with PISA 2029.

### **9.1. Empathise (Design Thinking) to Understand and Interact with AI (Media and Information Literacy)**

- Include INSET activities like classroom reality mapping (teacher interviews, learner observation) to understand how AI tools are used in public schools.
- Integrate school-based focus group discussions during INSET to capture teachers' experiences with AI platforms (e.g., Learning Management System, DepEd Commons).
- Promote the development of regional AI use profiles based on empathy exercises to guide future localised training plans.

### **9.2. Empathise (Design Thinking) to Assess the Benefits, Risks, and Ethics of AI (Media and Information Literacy)**

- Include the process of conducting Ethics Reflection Sessions during INSET, allowing teachers to identify potential risks such as bias, privacy breaches, and plagiarism, and to design appropriate classroom safeguards.
- Include the requirement for teachers to maintain ethics reflection journals during INSET to document emerging ethical concerns, contextual challenges, and insights related to AI-supported instruction.
- Include the implementation of risk-awareness workshops prior to the introduction of AI tools in lesson planning, ensuring that teachers critically examine possible harms and develop preventive strategies before integrating AI into classroom activities.

### **9.3. Define (Design Thinking) to Question Sources and Identify Biases (Media and Information Literacy)**

- Include INSET modules on spotting misinformation and bias in media and AI-generated content.
- Include the requirement for teachers to apply bias-check rubrics during lesson plan preparation in INSET, ensuring that instructional decisions and AI-supported materials are evaluated for fairness and inclusivity.
- Include the provision of hands-on activities for detecting algorithmic bias in AI-generated outputs during INSET, enabling teachers to practice identifying unfair patterns and develop strategies to address them in classroom contexts.

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#### **9.4. Define (Design Thinking) to Assess the Benefits, Risks, and Ethics of AI (Media and Information Literacy)**

- Require teachers to develop a risk register for any planned AI integration in classroom activities to ensure systematic identification of potential harms, vulnerabilities, and mitigation strategies.
- Require the alignment of problem statements with the PISA 2029 MAIL strands and ensure their documentation as part of INSET outputs to strengthen curricular coherence and competency-based planning.
- Include the use of ethics-based framing questions in INSET workshops to guide problem definition (e.g., “Whose rights, safety, or well-being might be affected when this AI or MAIL tool is used in the classroom?”) to ensure that problem framing remains learner-centred, ethical, and context-responsive.

#### **9.5. Ideate (Design Thinking) to Create and Engage Responsibly (Media and Information Literacy)**

- Include facilitated brainstorming sessions in INSET on responsible media use and engagement strategies under the theme “Foundation of Responsible Media Use: Balancing Screen Time and Learning Time” to equip teachers with practical, context-sensitive approaches.
- Require teachers to propose low-tech alternatives—such as offline digital self-learning modules, media bias-mapping activities, and curated educational video presentations—for classrooms with limited or unstable connectivity to ensure inclusive and equitable implementation of MAIL competencies.
- Institutionalise an Ethical Vetting and Expert-Bias Mapping process prior to prototyping to ensure that all proposed instructional solutions undergo systematic ethical review, address contextual realities, and remain free from stakeholder bias within the Philippine K–12 system.

#### **9.6. Ideate (Design Thinking) to Use AI Tools Effectively (Media and Information Literacy)**

- Provide training for teachers on free or low-cost AI resources—such as LearningFlowing.ai Library, Canva, MagicSchoolAI, Gradescope, and other teacher-friendly tools with free subscriptions—within INSET workshops to strengthen their capacity for lesson enhancement and creative instructional planning.
- Require the development of AI-supported instructional activities that uphold principles of inclusivity and transparency, ensuring that teachers intentionally design learning experiences aligned with ethical and equitable AI integration.

#### **9.7. Prototype (Design Thinking) to Communicate Ethically (Media and Information Literacy)**

- Integrate INSET sessions focused on developing accessible and bias-free prototypes, ensuring that teachers systematically apply ethical and inclusive design principles during instructional material development.
- Embed structured peer feedback loops to ensure validation of ethical communication within prototypes, enabling teachers to refine outputs through collaborative review and constructive critique.

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### **9.8. Prototype (Design Thinking) to Manage and Create with AI (Media and Information Literacy)**

- Establish safe AI practice spaces during INSET using familiar platforms such as DepEd Commons or Microsoft 365, enabling teachers to explore AI tools within secure and context-appropriate environments.
- Define clear standards for AI-assisted lesson outputs, ensuring that all teacher-created materials undergo careful review and demonstrate alignment with DepEd curriculum guides before classroom use.

### **9.9. Test (Design Thinking) to Analyse and Evaluate Information (Media and Information Literacy)**

- Require teachers to use evaluation dashboards to assess media credibility and verify the validity of AI-generated outputs during INSET.
- Mandate iterative testing cycles—beginning with small-group pilots—prior to full-scale classroom implementation.
- Integrate structured exercises that train teachers to triangulate diverse media sources (e.g., academic databases, government agency reports, news websites, social media posts, videos, and blogs) and to critically validate AI-generated content for accuracy, reliability, and ethical compliance.

### **9.10. Test (Design Thinking) to Assess the Benefits, Risks, and Ethics of AI (Media and Information Literacy)**

- Require stakeholder feedback loops (students, parents) during testing to assess ethical compliance.
- Enforce a structured risk reassessment after every test cycle, focusing on issues such as bias, data privacy, misinformation, accessibility, and learner safety, and require documentation of corresponding prototype improvements.
- Direct schools and divisions to conduct periodic audits of AI integration practices to ensure consistent ethical use, proper data handling, and alignment with policy expectations.

## **10. Feasibility Analysis**

Ensuring the successful implementation of the proposed DT × MAIL policy recommendations require a thorough assessment of their feasibility. This section focuses on three critical areas: (a) operational and technological feasibility, (b) financial readiness of INSET providers, and (c) sustainability frontiers of the recommendations. Evaluating these aspects helps determine the practicality and long-term viability of integrating DT with MAIL into INSET across the Philippines.

### **10.1. Operational and Technological Feasibility**

This dimension examines whether INSET providers and the DepEd have the capacity to deliver DT × MAIL-based training effectively. It considers the availability and accessibility of technological infrastructure, including computers, internet connectivity, learning management systems, and AI tools. It also assesses institutional readiness, such as the availability of trained facilitators, technical support staff, and established protocols for integrating AI and media literacy into workshops. Confirm that operational and technological requirements—such as functional devices, connectivity,

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secure platforms, and trained facilitators—are in place so teachers can effectively engage in DT × MAIL training and implement its outputs in their instruction.

## **10.2. Financial Readiness of INSET Providers**

Financial readiness evaluates whether INSET providers and the DepEd have the necessary resources to implement DT × MAIL–based training. This includes funding for workshop facilitation, procurement of AI and media tools, internet access, training materials, and compensation for facilitators. Assessing financial readiness ensures that the proposed reforms are economically viable within existing budget allocations and allows policymakers to identify areas requiring additional support to sustain high-quality teacher training.

## **10.3. Sustainability Frontiers of the Recommendations**

Sustainability focuses on ensuring that the integration of DT and MAIL remains viable and impactful over the long term, in alignment with Sustainable Development Goal (SDG) 4’s vision of inclusive, equitable, and high-quality education. This requires sustained professional development for trainers, continuous updating and maintenance of AI and media literacy resources, and robust monitoring and evaluation mechanisms that support data-informed recalibration of training programmes. Institutional backing is also essential to enable iterative improvement and ensure that the DT × MAIL framework evolves with emerging educational needs. By strengthening these sustainability pillars, the approach not only supports immediate training objectives but also builds enduring teacher capacity and advances long-term improvements in classroom practice consistent with SDG 4 commitments.

## **11. Strategic Benefits of the DT-MAIL-INSET Convergence among Filipino and Non-Filipino Young Learners**

INSET equips teachers with strategies, frameworks, and tools that directly translate into enhanced student learning. By integrating design thinking (DT) with media and information literacy (MAIL), professional development enables teachers to design classroom tasks that cultivate students’ critical thinking, creativity, digital literacy, ethical reasoning, and problem-solving (Blundell, 2024). In this way, INSET functions as a skills multiplier, transforming teacher learning into tangible, future-ready competencies for students in AI-rich learning environments. These competencies are most effectively developed when classroom activities are structured around the iterative phases of design thinking.

During the Empathise phase, learners map their own AI use through classroom discussions or digital journals, reflect on ethical dilemmas, and document their experiences, fostering reflection, analysis, and ethical reasoning. In the Define phase, they examine media and AI-generated outputs to identify bias, compare responses with credible sources, and record their findings, strengthening critical questioning, data literacy, and informed decision-making. During Ideate, learners brainstorm solutions for responsible AI engagement, design collaborative projects, and explore both low- and high-tech tools, developing creativity, collaboration, and ethical problem-solving. In the Prototype phase, they produce AI-assisted outputs such as portfolios, reports, or presentations and refine them through peer and teacher feedback, enhancing tool management, communication, and iterative design skills. Finally, in the Test phase, learners verify the accuracy of AI-generated content, revise their work based on feedback, and reflect on their learning process, building advanced critical thinking, information

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literacy, adaptability, and ethical judgment. Taken together, these classroom practices illustrate how the DT process operationalizes the skills targeted by MAIL-informed instruction (Tiernan et al., 2025; Tsang, 2025).

By linking INSET with DT and MAIL, teachers transform professional learning into meaningful student experiences. Each DT phase provides structured opportunities for students to practice and internalise skills essential for navigating digital environments, making informed decisions, and engaging ethically with AI technologies. The downstream benefits are significant: students become adaptive problem-solvers, digitally literate decision-makers, and ethically aware participants equipped with competencies essential for academic, professional, and societal contexts. This DT × MAIL-informed INSET approach ensures that teacher development focuses not only on mastering tools but also on designing learning experiences that prepare students for an evolving AI-driven world (Long & Magerko, 2020). Evidence from different educational contexts further demonstrates how these benefits manifest in practice.

While these benefits are generalisable, their impact varies by context. Among Filipino learners, DT-integrated e-learning in senior high mathematics has increased engagement and resourceful problem-solving (Erenea & Sarmiento, 2025). In Vietnam, DT-based STEM lessons improved students' critical thinking and application of STEM knowledge, with strong model fit indices supporting the instructional design (Nguyễn et al., 2025). In European research, school-based design thinking-making approaches documented gains in elementary students' cognitive skills, self-efficacy, and collaboration (Herodotou et al., 2025; Li et al., 2024). Overall, these studies show that Design Thinking strengthens students' engagement and higher-order skills across diverse educational contexts. However, implementing such approaches also raises practical considerations for educators and learners. Additional research demonstrates that combining design thinking with AI literacy in STEAM and interdisciplinary settings significantly enhances student creativity, critical thinking, and problem-solving, providing further empirical support for the DT × MAIL-informed INSET approach (King & Yan, 2025; Lin & Chang, 2025).

Several challenges may emerge for both teachers and learners in the coming years. Teachers may encounter time constraints, limited familiarity with emerging AI tools, and difficulty integrating DT frameworks with MAIL principles in culturally diverse classrooms. Learners may face uneven access to technology, disparities in digital literacy, and cognitive overload when navigating complex tasks. Addressing these challenges may require sustained INSET programs, scaffolded AI literacy instruction, and equitable access to digital resources.

## 12. Conclusion

Integrating Design Thinking and Media and Artificial Intelligence Literacy into In-Service Training is essential not only for teacher professional development but, more importantly, for advancing skills development among young people and early-career learners in alignment with PISA 2029. Existing INSET programmes show gaps in preparing teachers for ethical AI use, media credibility evaluation, and innovation-oriented problem solving, which limits effective classroom integration and exacerbates digital inequities. Embedding a DT × MAIL framework can strengthen teacher professional development by making it more human-centred, context-responsive, and practice-oriented. For policymakers and school leaders, these findings offer practical directions for redesigning INSET toward sustained capacity building rather than short-term tool exposure. By positioning teachers as skill multipliers, the DT × MAIL framework

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strengthens the connection between professional development, classroom practice, and learners' future employability, adaptability, and ethical participation in an AI-driven society. This policy brief draws from current literature and practitioner perspectives; implementation outcomes may vary across contexts. Overall, DT × MAIL–aligned INSET reforms can enhance instructional quality, ethical digital practice, and system readiness for an AI-mediated future.

### **13. Empirical Research Directions Arising from the Present Descriptive-Explanatory Work**

The present inquiry is descriptive–exploratory in nature and does not employ a formal empirical methodology. Rather, the paper develops a conceptual synthesis that integrates Design Thinking (DT), Media and Artificial Intelligence Literacy (MAIL), and In-Service Teacher Training (INSET) within the Philippine educational context. By examining how these elements may converge to strengthen teacher professional development and student learning, the study offers a conceptual framework that can guide future empirical investigations.

Several potential directions for empirical research emerge from the DT–MAIL–INSET convergence proposed in this work. Future studies may examine how participation in DT-informed INSET influences teachers' instructional practices, particularly how educators apply the iterative phases of design thinking to design learning tasks that incorporate media evaluation, ethical AI use, and responsible information practices. Empirical investigations may also explore how such classroom practices support students' acquisition of critical thinking, digital literacy, collaboration, ethical reasoning, and creative problem-solving skills when engaging with AI-generated content and media sources.

Further research may also consider contextual and implementation factors that influence the effectiveness of the proposed framework. Comparative studies may examine variations across school environments, levels of technological access, and institutional capacities, both within the Philippines and across other educational contexts. In addition, future inquiry may investigate the sustainability and scalability of DT–MAIL–informed INSET initiatives, including how professional learning structures can remain adaptive as AI technologies and digital learning environments continue to evolve. Together, these research directions provide pathways for empirically examining and refining the conceptual insights advanced in this study.

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# GILE Journal of Skills Development

## The Impact of Sustainability Education Mindset and Project Management Skills on Filipino Gen Z Pre-service Science Educators' Innovative Pedagogical Disposition

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### Abstract

The emergence of Generation Z as future professional teachers is reshaping the educational landscape, particularly within science education. Despite their increasing presence in pre-service teacher training, limited scholarship exists on their cognitive, affective, and psychomotor dispositions, especially within developing nations of the Global South. Considering their neoliberal orientations and their pivotal role in realising Sustainable Development Goal (SDG) 4 on Quality Education, this study examined how Sustainability Education Mindset (SEM) and Project Management Skills (PMS) influence their Innovative Pedagogical Disposition (IPD). Employing a quantitative design with bivariate (correlation) and multivariate (multiple regression) analyses, the study involved 141 Gen Z pre-service science teachers across key regions in the Philippines who completed the *robotfoto* and standardised instruments. Results revealed significant positive associations between several SEM and PMS sub-dimensions, although some pairings showed inverse relationships, reflecting the nuanced and multifaceted nature of their professional formation. Notably, SEM dimensions such as *Democratic Education* and *Inclusiveness in Education*, alongside PMS components like *Communication Skills* and *Managerial Competences*, emerged as significant positive predictors of multiple IPD sub-dimensions. Theoretically, the findings advance understanding of how sustainability-oriented mindsets and budding managerial proficiencies coalesce to shape innovative pedagogical tendencies among emerging science educators. Practically, the study underscores the necessity of embedding sustainability and project-based skill development in teacher education curricula to nurture Gen Z educators as agents of pedagogical innovation and dynamic sustainability.

**Keywords:** sustainability education, project management, innovative pedagogy, Gen Z, science educator

### 1. Introduction

The emergence of Generation Z (*Henceforth "Gen Z"*), a demographic born between 1997 and 2012 (Dimock, 2019), signals a transformative shift within contemporary educational organizations. As the newest entrants to the teaching workforce, with many of whom are still

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undergoing pre-service education training, they are poised to play an indispensable role in shaping the future of teaching and learning delivery systems. Scholars contend that the cohort's capacity to drive innovation and sustain progress necessitates an in-depth understanding of their 'Ethos' (Beliefs) and 'Personae' (Identity) as future professional teachers (Obmerga, 2025). In this regard, academic institutions must proactively brace for their peculiar cognitive, affective, and behavioural attributes to optimise their pedagogical prowess. Recent research has shown that their emerging teaching roles, anchored on efficient task and technological management, align with the transdisciplinary mandates of the United Nations' (UN) Sustainable Development Goals (SDG) no. 4: *Quality Education*, positioning them as key actors in advancing educational equity and excellence in modern-day classrooms (Chan & Lee, 2023).

By and large, as schools strive to contribute to the aforesaid development agenda, pre-service teachers are increasingly being immersed in sustainability-centric frontiers, aiming to cultivate responsible and forward-thinking educators (Obmerga & Yambao, 2025). Among the academic disciplines, science education provides a fertile ground for embedding the principles of Education for Sustainable Development (ESD), fostering a holistic understanding of sustainability challenges and its coveted solutions (Kyle, 2020). Given that Gen Z pre-service science educators will soon constitute the dynamic talent pool of the teaching profession, it is crucial to assess their potential contributions to sustainable teaching ventures. The age-group's ability to integrate sustainability and how they weave those practices into their pedagogies not just ascertain their instructional plan's fruition, but it can also significantly shape the future landscape of science education (Anwar et al., 2020).

Despite the growing emphasis on educational sustainability in recent years, there is a dearth of perspectives about how Gen Z pre-service educators operationalise the facets of sustainability in their classroom-related undertakings. The Sustainability Education Mindset ("**SEM**") in this inquiry refers to the cognitive attributes of such novice educators towards integrating sustainability into their innovative instructional perspectives. Understanding their SEM is vital in assessing their priorities concerning sustainability and how these translate into their skill-set as teachers. However, performative SEM alone does not guarantee effective implementation without requisite skills to actualise such notions (Çam-Tosun & Söğüt, 2024; Đajić et al., 2024). This brings to the fore the critical role of examining their Project Management Skills ("**PMS**") to ensure the execution of sustainability-driven instructional initiatives. PMS is operationalised in this study as the psychomotor ability to systematically oversee and painstakingly translate ideas under the larger purview of developing their dynamic teaching attributes.

Whether inward-tending or outside-looking, given the stereotypical characterizations associated with the generation of interest concerning intermittent compliance and nonlinear tendencies (Mahapatra et al., 2022), coupled with their entitled, impulsive, and narrow-minded archetypes as a collective (Lazar et al., 2023), such notoriety and reluctance to conform to rigid academic structures and stringent demands of science education raises intriguing questions about the interplay of their SEM and PMS into their Innovative Pedagogical Disposition ("**IPD**"). This study views IPD as an affective construct encompassing 21<sup>st</sup> century soft skills essential for setting the stage for a student-centred learning milieu. Given its potential for an enduring impact, their IPD becomes the critical outcome variable that could profoundly shape Gen Z's instructional practices. Such a purposeful classroom agenda, borne out of their intrinsic motivation to facilitate dynamic lessons, will give them a wider latitude of approaches to

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improve their classroom's learning climate (Jerusalem, 2020) and with the overarching goal of molding 'sustainability citizens' (Fujii & Lee, 2024, p. 3) in the future.

Albeit empirical efforts on Gen Z science educators are steadily expanding (Van Katwijk et al., 2021), there remains a significant gap in the literature that places their cognitive leanings and psychomotor potentials into the watch glass, along with their affective dispositions, as teachers-in-training. To date, no inquiry has explicitly investigated the trifocal lenses of SEM, PMS, and IPD, particularly in the context of a developing nation in the Global South, such as the Philippines. This quantitative inquiry generally purported to examine which among the sub-dimensions of SEM and PMS, respectively, impacts the sub-dimensions of IPD, ultimately uncovering preliminary insights of an undervalued yet promising aspect of the demographic's professional formation. Furthermore, as the apparent focus of educational inquiries in the coming years, a nuanced appreciation of how they operate as would-be educators could robustly ignite the theoretical and practical discourse on contemporary pre-service science educator preparation and their conduct of innovative pedagogies against the backdrop of sustainable frame of mind and project regulatory actions. Considering such assertions, this inquiry sought to answer the following Research Questions (“**RQs**”):

1. What is the respondents' performance profile in the specific sub-dimensions of the independent variables (SEM and PMS) and dependent variable (IPD)?
2. Is there a correlation that exists between the sub-dimensions of the independent variables: SEM and PMS?
3. Which among the sub-dimensions of (a) SEM and (b) PMS impact the respondents' IPD sub-dimensions?

## **2. Literature Review and Hypotheses Development**

### **2.1. The Cognitive and Psychomotor Attributes of Novice Science Educators**

The preparation of prospective science educators necessitates a nuanced appreciation of their cognitive and psychomotor competencies, particularly in the realm of sustainability ideation and project execution. Scholars posit that cognitive structures amplify the way teachers conceptualise sustainability (McNaughton, 2012), while psychomotor proficiency dictates their ability to materialise these notions into tangible classroom initiatives (Kalsoom & Qureshi, 2021). By the same token, recent research has shown that while mental learnings with sustainability facets is essential, the absence of sound project management skills may hinder the successful approaches and strategies (Rodríguez-Montequín et al., 2018). The relationship between SEM and PMS among Gen Z pre-service science educators remain a blank spot in the literature, hence it is imperative to examine whether these domains exhibit a meaningful association, as their interplay may define the effectiveness of their future science instructional practices.

**Null Hypothesis (H<sub>0</sub>) 1:** There is no significant correlation between the SEM and PMS of Filipino Gen Z pre-service science educators.

**Alternative Hypothesis (H<sub>a</sub>) 1:** There is a significant correlation between the SEM and PMS of Gen Z pre-service science educators.

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## 2.2. The Sustainability Education Mindset, Innovative Pedagogical Disposition, and Gen Z Educators

The SEM serves as a cognitive wellspring for pre-service science educators, shaping their instructional philosophies and commitment to integrating sustainability concepts into pedagogy. Recent literature trends have delineated that teachers who internalise sustainability principles exhibit higher levels of pedagogical innovation potential (McCunn et al., 2020). However, some scholars contend that mindset alone does not translate into pedagogical transformation unless reinforced by a deeply-seated affective propeller of professional practices (Fix et al., 2021). Given that Gen Z educators are digital natives known for their unconventional approaches to teaching and learning (Chan & Lee, 2023), it is crucial to determine whether their SEM influences their IPD. By empirically examining this linkage, the inquiry will unfurl the hidden terrain constituting the influence of specific mindset-driven agenda on pedagogical soft skills that drives the perspectives of the upcoming cohort of professional science educators.

**Null Hypothesis (H<sub>0</sub>) 2:** SEM sub-dimensions do not significantly impact the IPD of Filipino Gen Z pre-service science educators.

**Alternative Hypothesis (H<sub>a</sub>) 2:** One to two SEM sub-dimensions significantly impact the IPD of Filipino Gen Z pre-service science educators.

## 2.3. The Project Management Skills, Innovative Pedagogical Disposition, and Gen Z Educators

The PMS are pivotal in translating educational concepts into systematic and executable teaching avenues. Scholars argue that while sustainability mindset provides the cognitive impetus for innovation, it is the inherent ability to organise, implement, and sustain projects that determines the enduring pedagogical effectiveness (Toledo et al., 2021). In the same vein, recent research underscores that novice educators often struggle with project execution due to limited experience in managing instructional affairs (Sela & Harel, 2018). Considering the unconventional schema and erratic behaviours of the Gen Z as a demographic (Dimock, 2019), they are predisposed to adaptive yet unstructured learning methodologies. The cohort's PMS may serve as the critical determinant of their affective soft skills relating to innovative pedagogies. As this scholarly viewpoint remains uncharted, understanding whether effective PMS fosters a tempered IPD is crucial to uncover if the progressive generation can subscribe into stratified and strategic behavioural scaffoldings.

**Null Hypothesis (H<sub>0</sub>) 3:** PMS sub-dimensions do not significantly impact the IPD of Filipino Gen Z pre-service science educators.

**Alternative Hypothesis (H<sub>a</sub>) 3:** One to two PMS sub-dimensions significantly impact the IDP of Filipino Gen Z pre-service science educators.

## 3. Theoretical Framework

Anchored in Ajzen's (1985) Theory of Planned Behaviour ("*TPB*"), this study elucidates the dynamic interplay among SEM, PMS, and IPD within the milieu of Filipino Gen Z pre-service science educators. TPB posits that intention-driven actions stem from the alignment of attitudes, subjective norms, and perceived behavioural control; constructs that mirror the cognitive, affective, and conative dimensions shaping an educator's professional agency. Within this frame, SEM signifies the cognitive strand, reflecting educators' beliefs, values, and interpretive

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stances toward sustainability-oriented instruction. PMS embodies the conative or behavioural strand, representing the strategic and procedural competence required for the systematic execution of teaching innovations. IPD functions as the affective strand, encompassing both the emotional resilience and the creative adaptability that amplifies 21<sup>st</sup> century pedagogical practices. This theoretical underpinning situates Gen Z pre-service educators as active constructors of meaning whose cognitive awareness, operational skills, and value-laden dispositions interact to shape their pedagogical intentionality. Through correlational and regression analyses, the framework enabled the mapping of how sustainability-oriented cognition and project management efficacy collectively inform and reinforce innovative pedagogical conduct. Hence, TPB provided a robust explanatory lens for understanding how internalised sustainability beliefs and perceived regulatory capacities converge into purposeful instructional action among emerging science teachers in the contemporary era.

## 4. Methods

### 4.1. Research Design

The study employed a quantitative research approach to examine the relationship between SEM and PMS and their impact on IPD among Filipino Gen Z pre-service science educators. Anchored in a correlational-causal research design, the inquiry integrated descriptive and inferential statistical techniques, both bivariate and multivariate in nature. Descriptive statistics characterised respondents' demographic profiles and performance across the study's key constructs. Correlational analysis determined the strength of associations between the SEM and PMS, while multiple regression shed light on the specific sub-dimensions of SEM and PMS that have an impact towards the sub-dimensions of IPD.

### 4.2. Respondents and Locale

A total of one hundred forty-one (141) respondents participated in this study. Given the use of regression analysis, an *A priori* power analysis (Soper, 2025) was conducted before the data collection to ensure methodological rigor. The parameters were set with an effect size of Cohen's  $f^2 = 0.15$ , a statistical power of 0.8, and an  $\alpha$  level of 0.05. The independent variable with the highest number of predictors, the PMS with five (5) factor dimensions, was considered in determining the minimum required sample size, which was estimated at 127. The final sample ( $N = 141$ ) exceeded this threshold, reinforcing the study's reliability and validity. This sample size aligns with Hair and colleagues' (2010) recommendation of at least 100 cases for regression models with 3-5 predictors, ensuring stable parameter estimates and enhancing the generalizability of the findings.

The respondents were selected using purposive sampling, adhering to the following pre-set criteria, to wit: (a) natural-born Filipino citizen, (b) belongs to the Gen Z (1997-2012), (c) currently enrolled in the Bachelor of Secondary Education (BSEd), specialising in Science, programme in a Commission on Higher Education (CHED)-recognised private Teacher Education Institutions (“TEIs”), (d) having firsthand experiences in field study (classroom observations) or actual science teaching as part of their practicum (Year Levels 2-4), (e) possessing prior experience in project-based tasks and assessments during their undergraduate studies, (f) having awareness of sustainability concepts, particularly the UN's SDG no. 4. The inquiry was conducted in the National Capital Region (NCR) and Region IVA:

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CALABARZON, two of the key educational, economic, sociocultural, and political hubs in the Philippines. Table 1 summarises the demographic profile of the participants.

### 4.3. Instrumentation

The inquiry utilised a four-pronged instrument. The first segment captured the respondents' demographic profiles using a *robotfoto*, a Dutch term referring to a biographical sketch of the study participants, comprising checkboxes and blank fields of demographic information (Kelchtermans & Ballet, 2002). The subsequent sections employed standardised instruments with robust psychometric properties, in which the author has sought formal approval through correspondence from its respective original developers to utilise them in this investigation.

The SEM, defined as a cognitive orientation that embodies educators' awareness, values, and commitment towards embedding sustainability principles in teaching and learning contexts, was assessed using the 19-item Sustainable Education Scale (SES; Cronbach's  $\alpha = 0.92$ ) developed by Çam-Tosun and Sögüt (2023), which encompasses four (4) sub-dimensions, namely: *Quality in Education* ("QE"), *Inclusiveness in Education* ("IE"), *Equality in Education* ("EE"), and *Democratic Education* ("DE"), rated on a 5-point Likert scale (Strongly Disagree to Strongly Agree). Sample items include: "There are no differences among public schools in terms of the opportunities provided to the individuals in my country" and "Individuals are not discriminated against due to their language, religion, ethnicity, gender, etc. during their education in my country."

Moreover, the PMS, characterised as a set of procedural and strategic competences enabling educators to plan, organise, and implement instructional initiatives effectively within time, resource, and outcome constraints, was measured using the 45-item Project Manager Skills Scale (PMSS; Cronbach's  $\alpha = 0.97$ ) created by Đajić and associates (2024), which consists of five (5) sub-dimensions, namely: *Communicational Skills* ("CS"), *Technical Skills* ("TS"), *Technological and Methodological Competences* ("TMC"), *Managerial Competences* ("MC"), and *Management Style – Leadership* ("MSL"), rated on a 5-point Likert scale (Complete Disagreement to Complete Agreement). Representative questions consist of: "I believe that the project manager's effective verbal communication skills are essential for the project's success" and "I believe that the project manager's ability to set deadlines is important for the project's success."

Lastly, the IPD, described as an affective inclination to adopt, adapt, and sustain creative, reflective, and learner-centred approaches in education, was evaluated utilising the 40-item Teachers' Innovative Strategies Scale (TITSS; Cronbach's  $\alpha = 0.93$ ) by Jerusalem (2020), which includes four (4) subdimensions, namely: *Critical Valuing* ("CriV"), *Creative Valuing* ("CreV"), *Sociability* ("S"), and *Technological Valuing* ("TV"), rated on a 4-point Likert scale (Never to Always). The TITSS, originally designed to assess teachers' competencies in innovative pedagogy, was adjusted to emphasise affective dispositions by reframing its sub-dimensions to reflect emotional engagement, values, and intrinsic motivation. Illustrative statements encompass: "I reflect on teaching/learning problems and learn from experiences" and "I manifest courage to try new things in teaching or learning."

### 4.4. Data Gathering Procedure

Upon identifying respondents who satisfied the inclusion criteria, the author formally invited them to participate, providing a clear outline of the inquiry's objective and scope. Respondents who consented to join were given a Quick Response (QR) code linked to a Google Form

containing the four-pronged instrument. An embedded Informed Consent Form section was presented at the start of the form, requiring acknowledgement before proceeding with the survey. Explicit assurances of compliance with ethical parameters and the Data Privacy Act of the Philippines were provided. Respondents were extended ample time to complete the questionnaire, ensuring thoughtful responses and strategic instrument retrieval. Accomplished responses were scrutinised for completeness, yielding a 100% response rate. The dataset was then organised for statistical analysis and interpretation.

#### 4.5. Data Analysis

The author utilised the IBM Statistical Package for the Social Sciences (IBM - SPSS) version 25 to build the comprehensive respondent profile, encompassing both demographic and instrument performance dimensions. Inferential analyses included correlation analysis to examine the relationship among the independent variables and for multicollinearity purposes to ensure the independence of the variables. Subsequently, multiple regression analysis was conducted to determine which among the sub-dimensions of SEM and PMS impact the sub-dimensions of IPD. This analytical approach allowed for the insightful isolation of significant predictors in the emerged regression models.

#### 4.6. Ethical Considerations

The inquiry was cleared by Centro Escolar University, Manila – Coursework Publications under protocol code: PRSE352-SY2024-25-2. Apart from securing the Informed Consent Forms before the administration of the four-pronged instrument, the respondents were thoroughly briefed on the study’s overarching objective, procedural phases, minimal to zero risk, data management protocols, and strict compliance with privacy and confidentiality. They were also oriented of their right to withdraw from the investigation at any stage without any form of penalty.

### 5. Results and Discussion

#### 5.1. Description of the Study Respondents

TABLE 1. THE RESPONDENTS’ DEMOGRAPHIC PROFILE (N = 141)

Profile Component	f	%	Profile Component	f	%
<b>Age Range (Year Level)</b>			<b>Pre-service Science Teaching Exposure</b>		
23–24 (BSEd Sci Level 4)	74	52.50	Junior High School (Gr. 7-10)	76	53.90
21–22 (BSEd Sci Level 3)	65	46.10	Senior High School (Gr. 11-12)	58	41.10
19–20 (BSEd Sci Level 2)	2	2.00	<b>Other Teaching Assignment</b>		
<b>Sex</b>			Early Grades (Gr. 1-3)	3	2.10
Male	46	32.60	Middle School (Gr. 4-6)	4	2.80
Female	95	67.40	<b>Science Subjects Facilitated*</b>		
<b>Philippine Region of Origin</b>			Integrated Science	22	15.60
National Capital Region	76	53.90	Biological Science	65	46.10
IVA: CALABARZON	65	46.10	Physical Science - Chemistry	56	39.70
<b>Respondents’ belief if their TEI practices the SDG 4 (QE)</b>			Physical Science - Physics	76	53.90
Yes	122	86.50	Environmental Science	35	24.80
No	5	3.50	Earth and Life Science	40	28.40
Uncertain	14	9.90	Others	0	0

Notes: \*Multiple Responses; BSEd Sci – Bachelor of Secondary Education major in Science; Gr. – Grade; TEI – Teacher Education Institution; SDG 4 (QE) – Sustainable Development Goal no. 4 (Quality Education)

Source: Constructed by the sole author (2025)

This inquiry tapped into the quantifiable perspectives of 141 pre-service science teachers from private TEIs, with the majority aged 23–24 (52.50%) and 21–22 (46.10%), reflecting a cohort nearing the completion of their undergraduate degrees in secondary education, being at Level 4 and Level 3, respectively. Most respondents were female (67.40%), while 32.60% were male. Over half of the participants originated from the National Capital Region (53.90%), followed closely by those from CALABARZON (46.10%). This regional distribution suggests that the participants were immersed in academic environments with relatively greater access to instructional innovations and sustainability-aligned programmes.

In terms of pre-service teaching experience, most respondents were assigned to Junior High School (53.90%) and Senior High School (41.10%) levels, consistent with the departmentalised structure of science teaching in the Philippines. A strong presence was observed in major science subject areas, particularly Physical Science - Physics (53.90%), Biological Science (46.10%), and Physical Science - Chemistry (39.70%). However, only a few had experiences teaching Environmental Science (24.80%) and Earth and Life Science (28.40%), accentuating a potential gap in exposure to sustainability-focused content. Notably, 86.50% of respondents believed their TEIs actively uphold SDG no. 4 (Quality Education), a promising indicator of institutional alignment with global educational priorities. Still, the presence of uncertainty (9.90%) and disagreement (3.50%) suggests room for more visible and intentional integration of sustainability principles in pre-service science teacher education.

## 5.2. Exposition of the Statistical Analyses: RQ1: What is the respondents’ performance profile in the specific sub-dimensions of the independent variables (SEM and PMS) and dependent variable (IPD)?

### 5.2.1. Performance Profile Results (Independent Variables)

TABLE 2A. THE RESPONDENTS’ PERFORMANCE PROFILE IN THE INDEPENDENT VARIABLES’ SUB-DIMENSIONS

The Independent Variables and its Sub-dimensions	N	Min	Max	Mean	Std Dev
<b>Sustainable Education Mindset (SEM)</b>					
<i>Quality in Education (QE)</i>	141	1.50	5.00	3.63	0.65
<i>Inclusiveness in Education (IE)</i>	141	1.20	5.00	3.31	0.84
<i>Equality in Education (EE)</i>	141	1.77	5.00	3.53	0.66
<i>Democratic Education (DE)</i>	141	1.66	5.00	3.63	0.63
<b>Project Management Skills (PMS)</b>					
<i>Communication Skills (CS)</i>	141	2.00	5.00	4.11	0.49
<i>Technical Skills (TS)</i>	141	2.00	5.00	4.22	0.54
<i>Technological and Methodological Competences (TMC)</i>	141	2.00	5.00	4.14	0.51
<i>Managerial Competences (MC)</i>	141	2.00	5.00	4.23	0.52
<i>Management Style – Leadership (MSL)</i>	141	2.00	5.00	4.21	0.50

Source: Own SPSS v.25 calculation and processing of the sole author (2025)

In Table 2A, the respondents’ performance profile across the SEM sub-dimensions revealed nuanced perspectives on their engagement with the foundational pillars of sustainability in education. Among the four domains, both QE (M = 3.63, SD = 0.65) and DE (M = 3.63, SD = 0.63) obtained the highest mean scores. This indicates that Filipino pre-service science teachers generally exhibit an emergent orientation towards educational excellence and participatory

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approaches in classroom contexts. EE followed closely ( $M = 3.53$ ,  $SD = 0.66$ ), while IE registered the lowest mean ( $M = 3.31$ ,  $SD = 0.84$ ), suggesting greater variability in respondents' perceptions or application of inclusive practices.

In contrast, respondents displayed consistently high performance across the PMS sub-dimensions. MC ( $M = 4.23$ ,  $SD = 0.52$ ) emerged as the most dominant, followed by TS ( $M = 4.22$ ,  $SD = 0.54$ ), MSL ( $M = 4.21$ ,  $SD = 0.50$ ), TMC ( $M = 4.14$ ,  $SD = 0.51$ ), and CS ( $M = 4.11$ ,  $SD = 0.49$ ). The uniformly high means with minimal standard deviations reflect a strong self-perception of competence and confidence in managing projects among Filipino pre-service science teachers.

### *5.2.2. Performance Profile Discussion (Independent Variables)*

The results collectively illustrate that Gen Z pre-service science teachers are developing a promising sustainability-oriented mindset, yet certain dimensions warrant pedagogical strengthening. The high mean scores for QE and DE imply a growing appreciation of academic excellence and participatory learning environments, qualities aligned with the pursuit of sustainable education systems (Liou & Rojas, 2022). These tendencies may mirror TEIs increasing emphasis on quality assurance, reflective practice, and collaborative decision-making in instructional design.

However, the relatively lower performance in IE points to persisting challenges in the integration of diversity and equity principles. The higher standard deviation in IE underscores varying levels of exposure to inclusive pedagogies. As Lazar and associates (2023) noted, members of Generation Z often struggle to establish meaningful interpersonal connections within professional environments, a tendency that could impede inclusive teaching attitudes. This disparity also signals potential inadequacies in current teacher preparation programmes, particularly in preparing future educators to handle heterogeneous classrooms effectively. Symaco (2013) earlier emphasised that while access, equity, and participation are central to education policy, translating these principles into inclusive classroom practice remains an ongoing challenge. Limited classroom immersion with learners of differing abilities or cultural backgrounds, as highlighted by Lautenbach and Heyder (2019), may further restrict the internalisation of inclusive values among pre-service teachers. Consequently, embedding more experiential and field-based learning opportunities becomes essential to bridge the gap between theoretical understanding and applied practice in inclusive education.

On the other hand, the consistently high ratings across all PMS sub-dimensions reveal a favourable self-assessment of managerial and organisational capabilities. The strong performance in MC and TS reflects the structural features of many Philippine TEIs, which emphasise project-based learning, internship programmes, and capstone projects that cultivate leadership and coordination skills. These attributes are fundamental to 21<sup>st</sup> century teaching, wherein project-based, interdisciplinary, and collaborative modalities are increasingly prioritised. Nonetheless, while respondents reported high proficiency in managerial and technical areas, their relatively lower mean in CS suggests that articulation and rapport-building remain areas for development. As Parks (2020) observed, Gen Z's preference for mediated and asynchronous communication may hinder their interpersonal clarity in professional and pedagogical settings. Cultivating effective communicative competence, therefore, requires sustained scaffolding within teacher training curricula; particularly through interactive and collaborative teaching simulations.

Culturally, these findings resonate with Filipino socio-cultural values such as *Pakikipagkapuwa* (interpersonal connectedness) and *Bayanihan* (collective spirit), which, according to Landa-Jocano (2006), underpin cooperative and community-oriented behaviours. Harnessing these indigenous constructs within project-based and sustainability-oriented teacher education frameworks could enhance relational management, teamwork, and leadership capacities among pre-service science teachers. From a policy perspective, the data imply that sustainability and project management education should be more systematically integrated into teacher preparation programmes. Embedding explicit modules on inclusive education, leadership, and collaborative management, anchored on contextual Filipino values, could develop a new generation of Filipino science educators who are not only technically adept but also ethically and socially attuned. Such targeted curricular reforms can bridge micro-level pedagogical practice with macro-level sustainability goals, aligning teacher education with both national development priorities and the broader SDG no. 4 agenda.

### 5.2.3. Performance Profile Results (Dependent Variable)

TABLE 2B. THE RESPONDENTS' PERFORMANCE PROFILE IN THE DEPENDENT VARIABLES' SUB-DIMENSIONS

The Dependent Variable and its Sub-dimensions	N	Min	Max	Mean	Std Dev
<b>Innovative Pedagogical Disposition (IPD)</b>					
<i>Critical Valuing</i> (CriV)	141	2.00	4.00	3.23	0.41
<i>Creative Valuing</i> (CreV)	141	2.00	4.00	3.24	0.42
<i>Sociability</i> (S)	141	2.00	4.00	3.23	0.39
<i>Technological Valuing</i> (TV)	141	1.62	4.00	3.23	0.44

Source: Own SPSS v.25 calculation and processing of the sole author (2025)

In Table 2B, the respondents' performance profile across the sub-dimensions of IPD revealed a consistently moderate orientation across all constructs. CreV registered the highest mean ( $M = 3.24$ ,  $SD = 0.42$ ), CriV ( $M = 3.23$ ,  $SD = 0.41$ ), S ( $M = 3.23$ ,  $SD = 0.39$ ), and TV ( $M = 3.23$ ,  $SD = 0.44$ ). The narrow range of means and standard deviations suggests a relatively uniform level of engagement and competence among respondents, albeit with potential areas for growth in pedagogical inventiveness and transformative practices.

### 5.2.4. Performance Profile Discussion (Dependent Variable)

The moderate performance across all IPD dimensions indicates that the respondents possess emerging yet underdeveloped innovative capacities. The relatively higher means in CreV and CriV suggest growing awareness of creative and analytical approaches to teaching, core foundations for pedagogical innovation. However, the comparable levels across all domains imply that these dispositions remain at an exploratory stage, needing further cultivation through structured pedagogical experiences.

The modest score in TV underscores a key disjunction between digital fluency and its pedagogical application. While Gen Z is often considered technologically adept, the limited integration of educational technology in Philippine classrooms (Rombaoa, 2019) constrains their capacity to employ technology as an instructional innovation tool. This reflects a need for teacher education curricula to strengthen digital pedagogy through authentic, project-based experiences that encourage the design and implementation of technology-enhanced learning.

Sociocultural influences may also temper innovation. As Dimock (2019) observes, Gen Z's creativity often coexists with contingent sociability, while Filipino value of *Pakikisama* (harmonious interpersonal engagement) (Landa-Jocano, 2006) may discourage risk-taking and nonconformist experimentation in classrooms. These cultural dynamics shape a cautious engagement with innovation rather than overt disruption.

From a practical standpoint, TEIs must embed innovation-focused modules that integrate creativity, criticality, and technology as interdependent competencies. Establishing innovation laboratories, reflective mentorship, and assessment systems that recognise inventive science teaching could further enable Gen Z pre-service science educators to act as transformative agents within sustainability-oriented and technology-driven science education.

### 5.3. RQ2: Is there a correlation that exists between the sub-dimensions of the independent variables: SEM and PMS?

TABLE 3. THE CORRELATION MATRIX OF THE INDEPENDENT VARIABLES' SUB-DIMENSIONS

	QE	IE	EE	DE	CS	TS	TMC	MC	MSL
QE (SEM)	1								
IE (SEM)	0.73**	1							
EE (SEM)	0.78**	0.82**	1						
DE (SEM)	0.75**	0.76**	0.79**	1					
CS (PMS)	0.10	-1.02	-0.36	0.10	1				
TS (PMS)	-0.03	-2.10*	-1.66*	0.02	-0.91**	1			
TMC (PMS)	0.07	-1.38	-0.66	0.10	0.83**	0.87**	1		
MC (PMS)	-0.02	-2.63**	-1.83*	0.01	0.84**	0.93**	0.87**	1	
MSL (PMS)	-0.02	-2.36**	-1.72*	-0.00	0.86**	0.92**	0.85**	0.93**	1

Notes: \*  $p < .05$ , \*\*  $p < .01$

Source: Own SPSS v.25 calculation and processing of the sole author (2025)

#### 5.3.1. Independent Variables' Correlation Results

In Table 3, the correlation analysis was conducted on the sub-dimensions of the independent variables, utilising aggregated scores derived under the assumption of equidistant intervals in the Likert-type response scales. The results among the sub-dimensions of the SEM reveal a cohesive pattern of statistically significant positive correlations, underscoring the conceptual interrelatedness of equity-driven and democratic values concerning sustainability in the worldview of Filipino pre-service science teachers. The highest correlation was observed between EE and IE ( $r = 0.82$ ,  $p < .01$ ), followed by EE and DE ( $r = 0.79$ ,  $p < .01$ ), QE and EE ( $r = 0.78$ ,  $p < .01$ ), and QE and DE ( $r = 0.75$ ,  $p < .01$ ).

Meanwhile, a closer examination of the interrelationships among the sub-dimensions of PMS reveals a constellation of robust positive correlations, underscoring the mutually reinforcing nature of these competencies among Filipino Gen Z pre-service science teachers. Notably, TS displayed very strong associations with TMC ( $r = 0.87$ ,  $p < .01$ ), MC ( $r = 0.93$ ,  $p < .01$ ), and MSL ( $r = 0.92$ ,  $p < .01$ ), while CS significantly correlated with TMC ( $r = 0.83$ ,  $p < .01$ ), MC ( $r = 0.84$ ,  $p < .01$ ), and MSL ( $r = 0.86$ ,  $p < .01$ ).

Moreover, a revealing trend surfaces in the statistically significant negative correlations between SEM and selected PMS sub-dimensions. Specifically, IE negatively correlates with TS ( $r = -2.10$ ,

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$p < .05$ ), MC ( $r = -2.63$ ,  $p < .01$ ), and MSL ( $r = -2.36$ ,  $p < .01$ ). Similarly, EE exhibits inverse relationships with TS ( $r = -1.66$ ,  $p < .05$ ), MC ( $r = -1.83$ ,  $p < .05$ ), and MSL ( $r = -1.72$ ,  $p < .05$ ).

Finally, the non-significant correlations, particularly those between QE and all PMS sub-dimensions, CS ( $r = 0.10$ ), TS ( $r = -0.03$ ), TMC ( $r = 0.07$ ), MC ( $r = -0.02$ ), and MSL ( $r = -0.02$ ), suggest a disconnect between aspirational constructs and actionable competencies. Weak or statistically non-significant relationships were also observed between DE and certain PMS domains (e.g., DE-CS:  $r = 0.10$ ; DE-TS:  $r = 0.02$ ; DE-TMC:  $r = 0.10$ ; DE-MC:  $r = 0.01$ ; DE-MSL:  $r = -0.00$ ).

In light of the results, the null hypothesis ( $H_0$ ) 1, which claimed no significant correlation between SEM and PMS among Filipino Gen Z pre-service science educators, is rejected. Both significant positive and negative correlations emerged, indicating a nuanced relationship between SEM and PMS. Hence, the alternative hypothesis ( $H_a$ ) 1 is accepted, confirming the presence of statistically significant associations between the two constructs.

### 5.3.2. Independent Variables' Correlation Discussion

The strong positive intercorrelations among SEM sub-dimensions indicate that the respondents conceptualise sustainability through interconnected principles of equity, inclusion, and democracy. This coherence reflects a holistic commitment to socially just and learner-centred pedagogies, resonating with the Filipino communal values of *Pagtutulungan* (mutual help) and *Pakikiramdam* (attunement to collective sentiment) (Landa-Jocano, 2006). Such orientation mirrors the Gen Z inclination towards empathetic activism, suggesting that sustainability education is perceived as an ethical and relational endeavour rather than a technical framework (Maila & Pitsoe, 2012). Within science teacher education, this integrative stance is critical, as sustainable pedagogy must be both epistemologically inclusive and ethically grounded (Smith et al., 2022).

Similarly, the strong internal consistency among PMS sub-dimensions suggests that project management competencies among pre-service science teachers develop in synergy. The interplay between technical skills, managerial foresight, and digital proficiency denotes a coherent skill set aligned with contemporary project management frameworks (Li et al., 2020). This reflects the multitasking, technology-driven, and self-directed tendencies of Gen Z learners (Arkhipova et al., 2019; Weber & Keim, 2021). Rooted in *Pananagutan* (accountability) (Landa-Jocano, 2006), such dispositions challenge the stereotype of Gen Z as disengaged or immature (Dimock, 2019), highlighting instead their capacity for ownership and systemic organisation; traits indispensable in managing inquiry-driven science learning environments (Ruhrig & Höttecke, 2015).

However, the negative correlations between selected SEM and PMS sub-dimensions reveal a generational and pedagogical dissonance. The inverse relationship suggests that while inclusivity and equity are valued, these may not directly translate into managerial or technical confidence. This divergence may stem from the fragmented nature of teacher preparation in the Philippines, where affective and ethical dimensions such as *Pagkakaisa* (unity) are cultivated, yet operational skills receive less emphasis (Landa-Jocano, 2006). As Pramana and collaborators (2021) observed, Gen Z's advocacy-oriented idealism often faces challenges when applied within bureaucratic or procedural constraints. This signals a need for curriculum integration where sustainable values and management capacities coexist, allowing teachers to enact ethical principles within institutional realities (Parry & Metzger, 2023).

The absence of significant correlations between QE, DE, and several PMS domains underscores a gap between theoretical orientation and practical competence. This detachment may result from an overemphasis on conceptual ideals in the teacher education curriculum, at the expense of applied project execution. To bridge this, science teacher education must balance idealism with implementational literacy, equipping pre-service teachers to operationalise sustainability beyond rhetoric. Integrating Filipino interpersonal values like *Pakikisama* (harmonious engagement) (Landa-Jocano, 2006) with strategic decision-making skills may help future educators translate sustainable ideals into classroom innovations and community actions (Marangio et al., 2024; Obmerga, 2025).

#### 5.4. RQ3: Which among the sub-dimensions of (a) SEM and (b) PMS impact the respondents' IPD sub-dimensions?

TABLE 4A. THE MULTIPLE REGRESSION MATRIX OF THE SEM AND IPD VARIABLES

Model	Explanatory Variables	$\beta$ Coefficient	R <sup>2</sup>	F	t-value	p-value	VIF
<b>SEM sub-dimensions (IV) as Predictors → Specific IPD sub-dimension (DV)</b>							
<i>Model 1</i>	QE → CriV	0.03	0.03	1.19	0.24	0.81	3.06
	IE → CriV	-0.22			-1.42	0.15	3.63
	EE → CriV	-0.07			-0.41	0.68	4.42
	†DE → CriV	0.28			1.85	<b>0.03*</b>	3.24
<i>Model 2</i>	QE → CreV	0.12	0.08	3.25	0.89	0.37	3.06
	†IE → CreV	0.44			2.82	<b>0.00***</b>	3.63
	EE → CreV	-0.04			-0.23	0.81	4.42
	†DE → CreV	0.37			2.56	<b>0.01**</b>	3.24
<i>Model 3</i>	†QE → S	0.41	0.08	3.09	2.91	<b>0.00***</b>	3.06
	†IE → S	0.29			-1.91	<b>0.05*</b>	3.63
	EE → S	-0.20			-1.21	0.23	4.42
	DE → S	0.05			0.35	0.72	3.24
<i>Model 4</i>	QE → TV	0.16	0.06	2.20	1.13	0.25	3.06
	IE → TV	-0.14			-0.93	0.35	3.63
	†EE → TV	0.34			-1.96	<b>0.05*</b>	4.42
	†DE → TV	0.31			2.08	<b>0.03*</b>	3.24

Notes: † Significant Predictor; \* p < .05, \*\* p < .01, \*\*\*p < .001

Source: Own SPSS v.25 calculation and processing of the sole author (2025)

##### 5.4.1. Multiple Regression (SEM to IPD) Results

Multicollinearity diagnostics were conducted in both predictor variables prior to the formal regression analyses using Variance Inflation Factor (VIF) determination. All VIF values were found to be below the conventional threshold of 5, indicating an acceptable degree of independence among the variables (Field, 2013). The multiple regression analysis explored the relationships among Likert-scale variables, which were treated as interval-level data, consistent with accepted conventions in academic research methodology. Upon analyses, some predictors were found to be significant while others were not, revealing a differential pattern of influence among the SEM (Models 1 to 4) and PMS (Models 5 to 8) sub-dimensions. Each model offers a distinct analytical lens through which the predictive influence of specific SEM and PMS components on discrete facets of IPD can be discerned. Presenting all models enables a comprehensive portrayal of how cognitive orientations, procedural competences, and affective dispositions interact, rather than conflating them into an aggregated effect.

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In Table 4A, the regression models using SEM as predictors collectively produced  $R^2$  values ranging from 0.03 to 0.08, reflecting a modest explanatory power consistent with trends in educational research. In Model 1, only DE significantly predicted CriV ( $\beta = 0.28$ ,  $p = 0.03$ ), explaining 3% of the variance. The remaining predictors—QE, IE, and EE—were non-significant. This suggests that among the four dimensions of the SEM, DE, grounded in participation, shared authority, and learner voice, is most closely associated with the respondents' critical disposition.

In Model 2, two predictors emerged as significant: IE ( $\beta = 0.44$ ,  $p < .001$ ) and DE ( $\beta = 0.37$ ,  $p = 0.01$ ). Together, these predictors accounted for 8% of the variance in CreV. This finding indicates that the respondents tend to demonstrate higher creativity when they value inclusiveness and democracy in their teaching practice. The result emphasises the role of inclusive and participatory pedagogies in fostering innovative and adaptive behaviour among future educators.

For Model 3, both QE ( $\beta = 0.41$ ,  $p < .001$ ) and IE ( $\beta = 0.29$ ,  $p = 0.05$ ) significantly predicted Sociability (S), with the model explaining 8% of the variance. The positive association implies that respondents who value quality and inclusiveness in education are also more likely to engage in collaborative, peer-oriented, and community-based professional behaviour. These results align with the generational characteristics of Gen Z, who are known for their social connectivity and preference for teamwork.

Finally, in Model 4, DE ( $\beta = 0.31$ ,  $p = 0.03$ ) and EE ( $\beta = 0.34$ ,  $p = 0.05$ ) were found to be significant predictors of TV, explaining 6% of the variance. These findings demonstrate that respondents who hold strong democratic and equality-oriented educational values tend to perceive technology as a vehicle for equity and participation. This suggests that sustainability-oriented thinking among pre-service educators extends into their technological perspectives, linking innovation with access and fairness.

In light of the findings, the null hypothesis ( $H_0$ ) 2 is rejected in favour of the alternative hypothesis ( $H_a$ ) 2, as at least two sub-dimensions of the SEM, notably DE and IE, significantly influenced the IPD of Filipino Gen Z pre-service science educators. Such predictors underscore the strategic assimilation of sustainability-aligned cognitive orientations into the affective dimensions of pre-service science teacher training, suggesting that attributes such as inclusivity and democracy are not merely abstract ideals but are also emotionally internalised. These dispositions reveal a unique hybridity among the cohort: caring yet cautious, collaborative yet critically assertive, tradition-aware yet future-forward.

#### *5.4.2. Multiple Regression (SEM to IPD) Discussion*

The findings collectively illustrate that the SEM modestly influences the IPD of Gen Z pre-service science educators. Across all models, democratic and inclusive orientations consistently emerged as the strongest predictors, underscoring that valuing participation, equality, and learner voice promotes the cultivation of criticality, creativity, sociability, and technological engagement.

The prominence of DE as a recurrent predictor signifies that Gen Z's innovative dispositions are deeply rooted in social consciousness and participatory ethics. This aligns with characterisations of the generation as justice-oriented and reform-driven (Harari et al., 2023; Mahapatra et al., 2022). Within the Filipino cultural milieu, democratic ideals provide a socially acceptable channel for

expressing critique, given the cultural dynamics of *Pakikisama* (harmonious engagement), *Kahihyan* (a sense of shame), and *Utang na Loob* (debt of gratitude) (Landa-Jocano, 2006).

Similarly, the effects of inclusiveness and quality highlight how creativity and collaboration develop from collective engagement rather than individual effort. These results parallel Dimock's (2019) assertion that Gen Z educators embody adaptability and social problem-solving, particularly in resource-constrained environments. They transform inclusive values into creative acts of pedagogical redesign, reflecting the Filipino trait of being *Malikhain* (creative).

The association of DE and EE with technological engagement further implies that the cohort interprets technology not merely as a science instructional convenience but as an instrument of empowerment and equality (Kim & Lee, 2020; Mahapatra et al., 2022). Having witnessed technological inequities, Gen Z pre-service teachers approach digital learning with an ethical consciousness, linking access and sustainability with social justice imperatives.

Taken together, these insights demonstrate that sustainability-oriented values nurture not only cognitive and creative competencies but also moral and relational dimensions of pedagogy. This suggests that embedding sustainability education within science teacher preparation programmes may cultivate ethically grounded, socially responsive, and innovation-driven educators capable of advancing equity and transformative practice in science education.

TABLE 4B. THE MULTIPLE REGRESSION MATRIX OF THE PMS AND IPD VARIABLES

Model	Explanatory Variables	$\beta$ Coefficient	R <sup>2</sup>	F	t-value	p-value	VIF
<b>PMS sub-dimensions (IV) as Predictors → Specific IPD sub-dimension (DV)</b>							
Model 5	†CS → CriV	0.16			0.90	<b>0.03*</b>	4.37
	TS → CriV	-0.36			-1.33	0.18	4.64
	TMC → CriV	0.09	0.29	11.38	0.58	0.55	4.87
	†MC → CriV	0.43			1.75	<b>0.02*</b>	4.69
	MSL → CriV	0.23			1.04	0.30	4.87
Model 6	CS → CreV	0.15			0.89	0.37	4.37
	†TS → CreV	0.52			2.07	<b>0.04*</b>	4.64
	†TMC → CreV	0.33	0.40	18.59	2.27	<b>0.02*</b>	4.87
	MC → CreV	0.32			1.41	0.16	4.69
Model 7	MSL → CreV	0.37			1.79	0.07	4.87
	†CS → S	0.15			0.81	<b>0.05*</b>	4.37
	TS → S	-0.55			-1.96	0.41	4.64
	TMS → S	0.12	0.26	9.83	0.78	0.43	4.87
	†MC → S	0.72			2.86	<b>0.00***</b>	4.69
Model 8	MSL → S	0.05			0.24	0.80	4.87
	CS → TV	0.22			1.22	0.22	4.37
	†TS → TV	0.57			2.02	<b>0.04*</b>	4.64
	TMC → TV	0.20	0.25	9.31	1.23	0.22	4.87
	†MC → TV	0.52			2.06	<b>0.04*</b>	4.69
	MSL → TV	0.12			0.55	0.58	4.87

Notes: † Significant Predictor; \* p < .05, \*\* p < .01, \*\*\*p < .001

Source: Own SPSS v.25 calculation and processing of the sole author (2025)

#### 5.4.3. Multiple Regression (PMS to IPD) Results

In contrast to the modest effect sizes observed in Table 4A, the regression models in Table 4B demonstrated stronger explanatory power, with R<sup>2</sup> values ranging from 0.25 to 0.40. This

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indicates that the behavioural dimension of PMS exerts a more substantial influence on the affective qualities that constitute IPD among the respondents. The acceptable VIF values ruled out multicollinearity concerns, reinforcing the unique contribution of each PMS sub-dimension.

Model 5 yielded an  $R^2$  of 0.29, accounting for nearly a third of the variance in CriV. Two predictors were significant: CS ( $\beta = 0.16$ ,  $p = 0.03$ ) and MC ( $\beta = 0.43$ ,  $p = 0.02$ ). This suggests that clarity in communication and the capacity to coordinate resources and people significantly enhance critical and evaluative engagement among respondents.

Model 6, which accounted for 40% of the variance, exhibited the strongest explanatory power among all PMS–IPD models. Two predictors—TS ( $\beta = 0.52$ ,  $p = 0.04$ ) and TMC ( $\beta = 0.33$ ,  $p = 0.02$ )—significantly predicted CreV. This indicates that creativity within pedagogical contexts is closely linked with procedural mastery and structured methodological engagement.

Model 7 explained 26% of the variance in S. CS ( $\beta = 0.15$ ,  $p = 0.05$ ) and MC ( $\beta = 0.72$ ,  $p < 0.001$ ) both emerged as significant predictors. These results highlight that interpersonal and managerial competencies are key behavioural anchors in the social functioning of Gen Z educators.

Finally, Model 8 revealed moderate explanatory power ( $R^2 = 0.25$ ). Two predictors were statistically significant in predicting TV: TS ( $\beta = 0.57$ ,  $p = 0.04$ ) and MC ( $\beta = 0.52$ ,  $p = 0.04$ ). These findings imply that technology valuation is strongly associated with both technical mastery and effective management capacity, reflecting the behavioural underpinnings of digital engagement.

Given the statistically significant points uncovered in each model, the study rejects the null hypothesis ( $H_0$ ) 3, PMS sub-dimensions do not significantly impact the IPD of Filipino Gen Z pre-service science educators, in favour of the alternative hypothesis ( $H_a$ ) 3. Notably, MC emerged as a consistent predictor, dynamically pairing with CS, TS, and TMC in certain models. These configurations suggest a meaningful convergence between structured execution and relational fluency, wherein action-oriented skills support affective pedagogical orientations that value the intersection of IPD. Such integration points to a composite stance among this generation: decisive yet dialogic, tech-savvy yet socially attuned, methodical yet imaginatively responsive.

#### 5.4.4. Multiple Regression (PMS to IPD) Discussion

The results collectively underscore that Filipino Gen Z pre-service science educators' IPD are more behaviourally than cognitively anchored, as reflected in the notable explanatory power of the PMS–IPD models. In Model 5, the significant contributions of CS and MC to CriV entail that effective articulation and managerial coordination are central to cultivating a reflective and evaluative teaching stance. This resonates with the observation that Gen Z educators, shaped by rapid sociotechnical change, engage with pedagogical dilemmas as moral and systemic challenges rather than mere procedural issues (Dabke, 2018). The salience of MC supports Khadri's (2022) assertion that managerial foresight enables educators to navigate inquiry-based and dynamic science environments with balance and coherence. Filipino value systems, notably *Pananagutan* (accountability) and *Pagpapakatao* (humanistic consciousness) (Landa-Jocano, 2006), reinforce this synergy between behavioural precision and ethical reflexivity.

The high explanatory power of Model 6, where TS and TMC predicted CreV, highlights that creativity in science education is a deliberate, systematic process rather than spontaneous ingenuity. Gen Z science educators operationalise creativity through structured design and iterative practice (Obmerga & Yambao, 2025), aligning with DeHaan's (2009) view of

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creativity as both a cognitive and procedural act. This behaviour echoes the Filipino notion of *Diskarte* (resourceful agency), where innovation emerges from disciplined adaptation within constraints (Landa-Jocano, 2006).

Model 7 demonstrated that sociability thrives when communicative clarity and managerial synergy coexist. Teaching, being inherently collaborative, demands interpersonal fluency as a professional competence (Kolleck et al., 2021). In the Filipino collectivist milieu, social harmony is a pedagogical necessity as much as a cultural expectation (Landa-Jocano, 2006). These findings suggest that teacher education programmes should cultivate structured peer collaboration and mentorship systems to translate sociability into institutional cooperation, enhancing professional learning communities (Donnelly & Hume, 2014).

The final model (Model 8) revealed that TS and MC predict TV, suggesting that Gen Z educators' technological engagement stems from behavioural intentionality rather than innate digital fluency (Dimock, 2019). These results echo the principles of Technological Pedagogical Content Knowledge (TPACK) (Canbazoglu-Bilici et al., 2016), emphasising that effective technology integration relies on cumulative and situated practice (Lowell & Moore, 2020). The association of MC with technology use indicates a form of 'visionary pragmatism' (Coles, 2016, p. 19), wherein educators evaluate technology's pedagogical worth against broader equity and inclusion goals. The Filipino ethic of *Pagkalinga* (caring presence) (Landa-Jocano, 2006) further contextualises how technology becomes a tool for relational and transformative learning.

## 6. The Researcher's Reflexivity

Reflexivity, though more commonly associated with qualitative traditions, was deliberately integrated into this quantitative inquiry to foreground author positionality and epistemic integrity. As a Filipino science teacher formator, the researcher recognises that personal and professional convictions towards transformative, sustainability-oriented education may have informed the interpretive lens applied to the findings. Additionally, the use of standardised instruments originally constructed in Western contexts also invites reflection on issues of cultural validity, as Filipino conceptions of innovation, project management, and sustainability may embody relational and collectivist nuances not fully captured by such tools. Acknowledging these interpretive and contextual boundaries not only strengthens the study's credibility but also situates its statistical outcomes within the ethical responsibility of representing Filipino Gen Z pre-service science educators' lived educational realities with cultural and intellectual fidelity.

## 7. Conclusion

The pre-service science teacher education among the Gen Z is a significant global concern, garnering scholarly attention for both its pedagogical implications and its potential to shape the future of education. This quantitative study examined the impact of sub-dimensions of SEM and PMS on the multifaceted construct of IPD, with the intention of uncovering preliminary yet actionable insights into areas that remain largely underexplored within the cohort. The respondents' performance profiles, drawn from standardised questionnaires, suggest a critical need for contemporary science teacher education programmes to enhance experiential training on diversity and inclusive pedagogical practices, scaffold reflective dispositions, and integrate tech-savviness with deliberate, equity-centred instructional innovation. Moreover, the correlation analyses

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accentuated the imperative for science teacher education to bridge the gap between idealistic aspirations and practical implementation, emphasising the need for alignment between visionary goals and functional literacy to foster educators who are both futuristically minded and adept in project regulation. Lastly, the regression analyses further underscored the nuanced dynamics shaping the pedagogical formation of the respondents. Notably, the significant influence of democratic and inclusive orientations, coupled with communicative and managerial proficiencies, emerged as pivotal in cultivating innovative teaching dispositions. Positioned as key agents of sustainability, these future teachers require targeted formation to bridge mindset, project execution, and innovation in science education. The study's theoretical contributions, practical applications, limitations, and future directions are discussed below.

### **7.1. Theoretical Contributions**

This study offers three (3) notable theoretical contributions. First, while prior research has explored Gen Z's perspectives on contemporary science and non-science teaching and learning, much of the focus has been on microteaching (Menon et al., 2024) and generative Artificial Intelligence (AI) use (Chan & Lee, 2023). This inquiry is among the pioneering efforts to foreground the unexamined dimensions of SEM, PMS, and IPD within the context of Gen Z as active teachers-in-training, thereby expanding the boundaries of current scholarship. Second, a comprehensive review of the extant literature indicates that, within the Philippine and broader Southeast Asian contexts, previous investigations have focused on state certified, in-service Gen Z science educators, particularly in areas such as safe laboratory teaching praxis (Obmerga, 2025) and informal professional learning (Obmerga & Yambao, 2025). In contrast, this study is among the preliminary efforts to tap into the worldview of pre-service science teachers, offering cutting-edge insights into the pre-service science education landscape and capturing the nuanced perspectives of the cohort situated in the Global South. Third, this inquiry introduces a series of regression models that offer empirically grounded frameworks for advancing SEM, PMS, and IPD within the purview of SDG no. 4 (Quality Education). These models highlight both the competencies in need of targeted interventions and the promising developmental pathways that warrant sustained support among the age-group.

### **7.2. Practical Implications**

This inquiry articulates several practical implications that are vital to the reconfiguration of science teacher education in the contemporary, sustainability era. First, the findings offer actionable insights for curriculum designers, programme developers, and policymakers in shaping the holistic formation of Gen Z pre-service teachers. Through the integration of SEM, PMS, and IPD, TEIs can purposefully design learning experiences that foster agency, ethical sensitivity, and adaptive expertise among science educators. Second, the study underscores the importance of acknowledging and harnessing the worldview of Gen Z science teachers-in-training. Their unique orientations towards collaboration, digital fluency, and innovation present both challenges and opportunities for TEIs. Engaging these dispositions early enables institutions to align training designs with evolving professional demands and to nurture educators capable of responding to the moral and environmental imperatives of the 21<sup>st</sup> century classroom. Third, the regression models derived from the study may serve as diagnostic and developmental tools that allow TEIs to map skill trajectories, identify capacity gaps, and construct targeted interventions. Such evidence-informed frameworks can guide the design of

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early professional learning pathways that enhance reflexive pedagogy, futures thinking, and value-driven teaching practice—all central to sustainability-oriented education. Lastly, the implications of this study transcend national boundaries. Its conceptual and empirical insights may be applicable to other communitarian Global South contexts where the integration of sustainability education and innovative pedagogy remains emergent. By promoting culturally responsive, contextually grounded, and generationally attuned teacher preparation, the study contributes to a broader dialogue on how science education can be re-envisioned to advance the SDGs and equip future educators for transformative praxis.

### 7.3. Limitations and Future Research Directions

This study bears limitations typical of quantitative inquiries. The use of non-probabilistic sampling restricts the external validity of the findings, which should therefore be interpreted as indicative of trends within the sampled regions rather than nationally generalisable. Although the sample size satisfied power analysis requirements, it may not fully represent the demographic and institutional heterogeneity of Filipino Gen Z pre-service science educators. Future replications are encouraged to encompass a broader range of TEIs across the Philippines to enhance representational robustness.

Subsequent research may employ Covariance-Based *Structural Equation Modelling* (CB-SEM) to validate the hypothesised relationships among variables using larger and more diverse datasets. Likewise, the application of Conjoint Analysis (CA) could offer valuable insights into how pre-service science educators prioritise facets of *Sustainability Education Mindset* (SEM), PMS, and IPD, by revealing the implicit trade-offs embedded in their professional reasoning. Complementary qualitative approaches, such as Glaserian grounded theory or Husserlian phenomenology, are also recommended to deepen understanding of the educators' evolving 'lived ESD' (Fujii & Lee, 2024, p. 8), professional identity formation, and pedagogical agency in the age of the SDGs. Finally, future inquiries could explore the intersection of SEM, PMS, and IPD with other emergent variables in science education, such as digital pedagogical technostress, ecological literacy, and ethical sustainability leadership, to construct a more holistic framework for transformative science teacher education and beyond.

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### **Ethics Statement**

For studies involving human participants, the authors confirm that the research complied with relevant institutional and national ethical standards. Ethical approval was obtained where required, and informed consent was secured from all participants prior to data collection. If ethical approval was not required, the authors confirm that the study adhered to applicable ethical guidelines.

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## Leadership Lessons from Westeros: A Qualitative Case Study on Game of Thrones as a Springboard for School Leadership Learning among Filipino Gen Z In-Service Teachers

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### Abstract

As Generation (Gen) Z enters the teaching profession, understanding the foundational skills (propaedeutics) required for future effective school leadership is critical. Considering their emergent organisational behaviour patterns, Game of Thrones (GOT) offers rich narratives and tropes that illustrate strategic planning, navigating tensions, and cultivating relational influence, providing a compelling lens for informal leadership learning. This qualitative case study explored twelve (12) purposively selected Filipino Gen Z in-service teachers, examining how engagement with GOT television series informs their preliminary preparation for school leadership. Semi-structured interviews captured participants' reflections, which were analysed through Thematic Analysis. The study advances a nuanced *Typology of GOT Popular Culture-driven Propaedeutics for School Leadership Learning* among Filipino Gen Z in-service teachers, foregrounding three (3) interrelated themes: the *Logistics of School Leadership*, the *Politics of School Leadership*, and the *Rhetorics of School Leadership*. These themes captured how participants made sense of operational decision-making, power negotiations, alliances, moral tensions, and persuasive communication through familiar GOT episodes, and how such sensemaking functioned as an accessible springboard for reflecting on school leadership aspects. Theoretically, the findings enrich modern leadership learning and preparation by illustrating how popular culture mediated contexts can cultivate early leadership cognition, ethical discernment, and strategic awareness among emerging educational leaders. Practically, the study demonstrates how thoughtfully curated popular culture elements may be harnessed within formal and informal professional learning spaces to align with Gen Z teachers' interpretive routines, thereby strengthening their readiness for future leadership and influence within contemporary educational organisations.

**Keywords:** school leadership, propaedeutics, Generation Z, popular culture, Game of Thrones

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## 1. Introduction

The Generation Z (hereafter “**Gen Z**”), comprising individuals born between 1997 and 2012 (Dimock, 2019), represents a new cohort now igniting positive impacts in the educational sector (Obmerga, 2025; Obmerga & Yambao, 2025; Aggarwal et al., 2020). Their gradual yet visible integration into the workforce signals not merely a demographic shift but a deeper cultural and intellectual reconfiguration of how work, influence, and professional identity are conceptualised (Schroth, 2019). Within education, the immediate predecessors of this age-group, the millennials, once disrupted and subsequently redefined pedagogical, managerial, and leadership practices as they ascended through institutional hierarchies (Bogosian & Rousseau, 2017). In much the same way, the entry of Gen Z is expected to give rise to a novel organisational reality, marked by an alternative consciousness towards diversity, fluidity, and participatory forms of governance (Ozkan & Solmaz, 2015).

This emerging generational dynamic bears profound implications for educational leadership and succession planning. As millennial academic managers are poised to occupy the upper echelons of institutional leadership in the near future (Obmerga & de Guzman, 2024), the Gen Z in-service teachers now entering the professional sphere will inevitably constitute the next generation of educational leaders. In this light, the preparation of this new cohort cannot simply rely on replicating traditional models of leadership training that served earlier generations. As Anderson and collaborators (2017) emphasise, the leadership strategies and developmental paradigms effective for one generation may not be transferable to another. Each generational group is marked by its own experiential lexicon; its own ways of engaging with authority, collaboration, and innovation. Hence, educational institutions must proactively design leadership preparation mechanisms that are agile enough to accommodate the sociocultural and cognitive dispositions of the Gen Z (Demirbilek & Keser, 2022).

Whether examined internally through school-based professional learning communities or externally through higher-level capacity-building programmes, there exists a growing recognition of the need to reimagine leadership preparation as a developmental continuum (Bălan & Vreja, 2018). This continuum should not commence abruptly with formal training, but should rather begin with a formative, propaedeutic phase; one that equips future leaders with the conceptual scaffolds necessary to make sense of leadership before entering formalised programmes. The term propaedeutic, derived from the Greek *propaideuein* meaning ‘to teach beforehand,’ refers to an introductory or preparatory form of learning that precedes and grounds formal study (Krasnova, 2013). In the context of leadership development, propaedeutic learning constitutes the stage where nascent leaders begin to develop rudimentary understandings of influence, ethics, and organisational dynamics through indirect, experiential, or mediated encounters such as observation of leadership practices, reflective dialogue with peers, and personal interpretation of complex social situations. Such praxis involves not merely the acquisition of terminologies or theories, but the cultivation of an interpretive lens through which leadership phenomena are first perceived and later formalised in structured learning settings.

An emergent and highly promising pathway for such propaedeutic leadership learning lies within the domain of popular culture. Popular culture encompasses the constellation of artefacts, rituals, and systems of meaning that characterise a society’s dominant lifeways at a particular historical juncture (Rhodes & Parker, 2008). It bridges traditional and digital media,

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including books, television series, films, games, art, and music, and embeds itself into the everyday practices and collective consciousness of a generation (Thompson, 2007). Its persistence and ubiquity make it a powerful site for *informal* education, one capable of shaping not only linguistic and behavioural patterns but also moral and cognitive orientations (Godsil et al., 2016). Here, *informal* denotes the reflexive, experiential nature of propaedeutic learning, emphasising sensemaking over prescribed instruction, whether occurring inside formal programmes or through broader, mediated experiences. Through its characters, plots, and moral dilemmas, popular culture offers its audience symbolic encounters with the complexities of human conduct, authority, and relational ethics: concepts that lie at the very core of leadership.

Grindstaff (2008) noted that the saturation of popular cultural elements within a generation's consciousness signifies their deep pedagogical potential, as these elements come to serve as interpretive anchors for understanding the social world. Jubas (2023) further asserts that popular culture can function as a powerful springboard for exploring complex social or organisational constructs, even before learners formally encounter them in academic settings. Previous educational inquiries have drawn upon popular narratives such as J. K. Rowling's *Harry Potter* (Yu et al., 2022) and J. R. R. Tolkien's *The Lord of the Rings* (Urlick, 2014) as informal yet potent tools for cultivating leadership awareness. These prior studies provide narrative simulations of ethical decision-making, alliance formation, and the exercise of influence: concepts transferable to real-world educational leadership contexts.

For the Gen Z cohort, one of the most formative and resonant cultural artefacts during their adolescence and early adulthood has been George R. R. Martin's *A Song of Ice and Fire* ("*ASOIAF*", 1996–present), later adapted by a U.S.-based premium cable television network, Home Box Office (HBO), into the globally acclaimed television series *Game of Thrones* ("*GOT*", 2011–2019). Set in the fictional medieval realm of Westeros, *GOT* chronicles the contest for the Iron Throne among houses of divergent motives, values, and leadership styles (Flint, 2019). The series' narrative complexity, moral ambiguity, and thematic focus on governance, legitimacy, and strategic influence render it a fertile text for interpreting leadership in its nascent and experiential form. Yu and Campbell (2021) argued that its depiction of power dynamics, ethical dilemmas, and the consequences of decisions provides learners with heuristic models for reflecting on leadership in both personal and organisational contexts.

As Gause (2005) observes, recurring motifs in television narratives often encapsulate microcosms of organisational life, enabling critical reflection through metaphorical interpretation. Güven and Keleşoğlu (2014) similarly posited that the visual and symbolic richness of popular culture constitutes a natural repository of insights for teachers, particularly when studied through qualitative research designs that illuminate its deeper social meanings. Yet, despite this potential, there remains a paucity of empirical work that situates popular culture, specifically *GOT*, as a propaedeutic avenue for leadership preparation. This gap is especially evident in developing educational contexts in the Global South, such as the Philippines, where leadership development models remain largely derivative of Western epistemologies and where locally meaningful, culturally embedded alternatives have yet to be systematically explored.

Against this backdrop, the inquiry sought to illuminate how popular culture, through the medium of *GOT*, may serve as a preparatory foundation for understanding leadership among Filipino Gen Z in-service teachers. Anchored on a qualitative case study design, this study

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explored how GOT functions as a propaedeutic learning stimulus that informs leadership preparation practices among this emergent cohort. By examining this case, the study uncovered how Gen Z teachers' engagement with the GOT narrative provides foundational insights into influence, decision-making, and ethical stewardship; concepts juxtaposed to effective school leadership in contemporary educational organisations. Accordingly, this inquiry addressed the central question: “*What leadership learning lessons can be derived when Game of Thrones is employed as a propaedeutic medium for school leadership development among Filipino Gen Z in-service teachers?*”

## **2. Theoretical Framework**

This inquiry was anchored in Multimedia Learning Theory (Mayer, 2020; Bandura, 2001) and Self-Directed Learning Theory (Garrison, 1997), which together elucidate how GOT popular culture functions as a propaedeutic learning stimulus for leadership among Filipino Gen Z in-service teachers. Multimedia Learning Theory posits that learning is optimised through multimodal engagement where words, images, and emotions coalesce to shape cognition. Extending Bandura's (2001) view of symbolic modelling, media narratives such as GOT become powerful vehicles for vicarious learning, enabling individuals to observe leadership dynamics, ethical tensions, and decision-making complexities within simulated social contexts. Through these portrayals, learners actively construct meaning, forming cognitive scripts of leadership that mirror the realities of influence and stewardship within educational organisations.

Complementing the underpinning above is the Self-Directed Learning Theory, which emphasises the learner's autonomy in identifying, interpreting, and applying insights from experiential or mediated encounters. Gen Z teachers, characterised by self-reliance and preference for informal, interest-driven learning, engage with GOT not merely as entertainment but as a reflective exercise that allows them to internalise leadership principles through self-initiated interpretation. The convergence of these theories underscores that leadership learning can occur informally yet meaningfully through media engagement, where self-directed reflection transforms cultural consumption into formative preparation. Within this framework, GOT serves as a pedagogical prelude: a propaedeutic space wherein future educational leaders cultivate foundational awareness of ethical, strategic, and interpersonal dimensions of leadership practice.

## **3. Methods**

### **3.1. The Research Design**

This study employed a qualitative approach, specifically a *single-case study* design, to explore how GOT functions as a propaedeutic learning stimulus for leadership among Filipino Gen Z in-service teachers. The single-case study design was deemed most appropriate because the inquiry focuses on a bounded, culturally and contextually specific phenomenon, the interpretive engagement of a distinct cohort with a particular media text, rather than on comparing multiple cases (Yin, 2018). This design facilitates an in-depth, holistic examination of participants' reflections, experiences, and meaning-making processes, enabling the construction of a *Typology of GOT Popular Culture-driven Propaedeutic for School Leadership Learning*, grounded in rich data.

### 3.2. The Research Participants

The phenomenon was explored in-depth through the perspectives of twelve (12) Filipino Gen Z in-service teachers (Table 1), who were purposively selected according to the following inclusion criteria: (a) natural-born Filipino citizen; (b) belonging to the older segment of Gen Z (born 1997 to 1999); (c) currently employed in a teaching capacity, regardless of discipline, within an educational institution; (d) not yet occupying a formal leadership role or an informal designation entailing leadership responsibilities within their respective academic organisations; (e) familiar with the history and lore of George R. R. Martin’s ASOIAF or having viewed the GOT television series produced by HBO; and (f) willing to actively participate in the study. This purposeful selection ensured that participants could provide informed and meaningful insights regarding the potential of GOT as a propaedeutic tool for leadership development, while maintaining a bounded and contextually coherent case for investigation.

The participants hailed from twelve (12) distinct educational institutions across the regions of the Philippines, comprising six (6) public and six (6) private basic (elementary and high school) educational institutions, with each participant representing a unique organization. The final sample size was determined based on the point of data saturation, initially recruiting nine (9) participants and subsequently including three (3) additional participants to verify and confirm the emerging themes, ensuring that no new insights were forthcoming. The author had no prior connection with any participant or institution. Recruitment was conducted via a post on a Philippine-based Reddit thread, to which individuals responded voluntarily. No monetary incentives were provided to participants for their involvement in the study.

TABLE 1. THE STUDY PARTICIPANTS ( $N = 12$ )

Code	Age	Gender	Highest Educational Attainment	Disciplinary Teaching Focus	Tenure in the Educational Organisation	No. of Years Watching the GOT Series and Reading the ASOIAF Novels
P1	25	M	B	Science	1 y	10 y
P2	25	M	B	Language Arts	1 y	8 y
P3	25	F	B	Mathematics	1 y 5 m	7 y
P4	24	M	B	Science	1 y 1 m	9 y
P5	25	F	B	Science	2 y	10 y
P6	25	F	B	Mathematics	2 y 1 m	10 y
P7	24	M	B	Social Studies	7 m	9 y
P8	25	M	B	Mathematics	11 m	10 y
P9	25	F	M	Language Arts	1 y 1 m	9 y
P10	24	M	B	Language Arts	5 m	6 y
P11	25	F	M	Social Studies	10 m	10 y
P12	24	M	B	Social Studies	1 y	9 y

Legend: M: Male; F: Female; B: Bachelor’s degree; M: Master’s degree; y: year(s); m: month(s)

Source: Constructed by the sole author

### 3.3. The Instrumentation

A two-pronged instrument was developed to collect relevant data from the study participants. The first component involved the creation of participants’ *robotfoto*, a Dutch term denoting a cartographic sketch, which served to capture baseline characteristics and contextual information

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about each participant (Kelchtermans & Ballet, 2002). The second component comprised a semi-structured interview guide featuring open-ended questions derived from a set of *A priori* constructs aligned with the key dimensions of propaedeutic learning, GOT/ASOIAF engagement, popular culture, and school leadership identified in the literature.

To ensure comprehensive coverage of all dimensions within the *A priori* question development, an aide mémoire was employed during the interviews as a reference guide. Sample questions included: “*What aspects of GOT/ASOIAF make it suitable for leadership appreciation and learning?*”, “*Is there a particular character from your viewings or readings who you consider a potential source of inspiration for your future leadership practices?*”, and “*Can you recall any line or scene that, in your view, exemplifies leadership?*” This question development approach facilitated both structured data collection regarding participant characteristics and rich, reflective narratives that illuminated the preparatory (propaedeutic) learning potential of popular culture for leadership development. Additionally, the semi-structured interview guide was subjected to expert validation by two (2) qualitative research specialists, both of whom concurred that the formulated questions were sufficiently aligned with the study’s aims and possessed the capacity to elicit rich, in-depth accounts capable of illuminating the phenomenon under investigation.

### **3.4. The Data Gathering Procedure**

Prior to participation, informed consent was obtained from each participant to ensure ethical compliance and voluntary engagement. Selected participants attended an initial briefing session during which the nature of the study, the scope of their involvement, and the anticipated procedures were clearly explained. Following this, individual in-depth interviews and storytelling sessions were conducted to elicit rich, contextualised narratives. All interviews and probing sessions (Robinson, 2023) were audio-recorded and were then transcribed verbatim, preserving participants’ wording, pauses, and emphasis to maintain the integrity of the data for subsequent thematic analysis. Each session lasted approximately 1.5 hours, allowing sufficient time for participants to articulate their reflections on GOT/ASOIAF and its potential as a propaedeutic medium for leadership learning. Upon conclusion of the interviews, debriefing sessions were held to provide participants with the opportunity to express their emotions, clarify points, and pose questions regarding the study, thereby ensuring both ethical sensitivity and the integrity of the data collected.

### **3.5. The Ethical Considerations**

All participants were provided with detailed written and verbal information regarding the objectives, procedures, phases, and scope of their involvement in the study. They were explicitly informed of their right to withdraw from the research at any stage of the data-gathering process without any adverse consequences. In addition, each participant signed a formal informed consent form, which had been rigorously reviewed and approved by the Ethical Review Board of their respective institutions prior to the commencement of the study. These measures ensured adherence to the highest standards of ethical research practice, safeguarding participants’ autonomy, confidentiality, and well-being throughout the inquiry.

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### 3.6. The Mode of Analysis

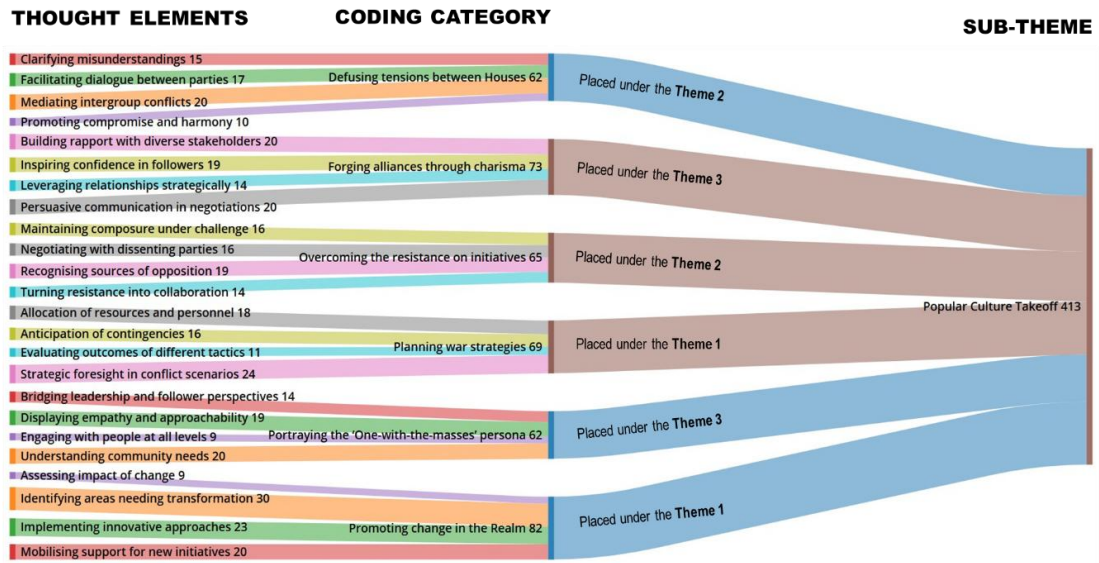
Data were analysed using Thematic Analysis (“TA”) as articulated by Braun and Clarke (2013), an elicitation method well-suited for exploring the depth and complexity of qualitative narratives within a bounded case study. TA was chosen for its flexibility in identifying, analysing, and reporting patterns of meaning. The process followed Braun and Clarke’s six-phase framework: (a) familiarisation with the data, through repeated reading of transcripts and reflection on participants’ narratives; (b) initial coding, whereby meaningful units of text were labelled according to alignment with *A priori* codes (propaedeutic learning, popular culture, GOT/ASOIAF, and school leadership) and emergent ideas; (c) searching for themes, organising codes into potential thematic clusters that captured recurring patterns of leadership learning; (d) reviewing themes, ensuring coherence within and distinctiveness between themes while maintaining fidelity to participants’ interpretations; (e) defining and naming themes, articulating the essence of each leadership construct; and (f) producing the report, integrating the thematic findings into a structured typology.

#### 3.6.1. The Inductive Thematisation Trail (Focusing on the Shared Sub-themes)

This segment presents the thematisation trail of the thematic analysis, with particular emphasis on the inductive development of shared sub-themes that cut across the major themes reported in the Findings. Attention to this section is essential, as it elucidates the granular analytic details that collectively constitute the study’s major themes, which are discussed at a higher level in the main Findings. Since the primary results focus on the major themes, this segment provides the necessary analytic depth that underpins their construction. To visualise the complex relational flow of these analytic movements, Sankey Diagrams were utilised for each shared sub-theme (Figures 1–3). The Sankey Diagram was chosen over traditional matrices or hierarchical trees due to its capacity to represent both the magnitude and directionality of thematic progression, depicting how thought elements flowed seamlessly into higher-order coding categories. This visualisation effectively conveyed the interdependence among codes and their eventual convergence into the broader sub-thematic structure, offering a transparent, data-grounded view of sub-thematic density and conceptual transition. It should be noted, however, that the arrangement and colour coding of the Sankey diagrams (Figures 1–3) were software-generated; accordingly, textual signposts have been placed at the top of each figure to clearly denote the *thought elements*, *codes*, and *sub-themes*. The flow of the categorisation of codes under their respective major themes is likewise made explicit within the figures and reinforced through the accompanying explanation.

The trajectory of thematisation in this qualitative inquiry unfolded through a recursive and reflective analytic process anchored in Braun and Clarke’s (2013) TA. Meaning units of text were first broken down into thought elements, clustered through interpretive coding, and progressively abstracted into broader (sub)thematic categories. This process generated three (3) shared sub-themes: *The GOT Popular Culture Takeoff*, *The Future Leadership Intake*, and *The Enduring Takeaway*, each cutting across the overarching thematic dimensions of the inquiry: *The Logistics, Politics, and Rhetorics of School Leadership*. Collectively, these shared sub-themes across themes illuminate how Filipino Gen Z in-service teachers internalised and recontextualised leadership principles drawn from GOT narratives into their own developing philosophy and praxis of school leadership.

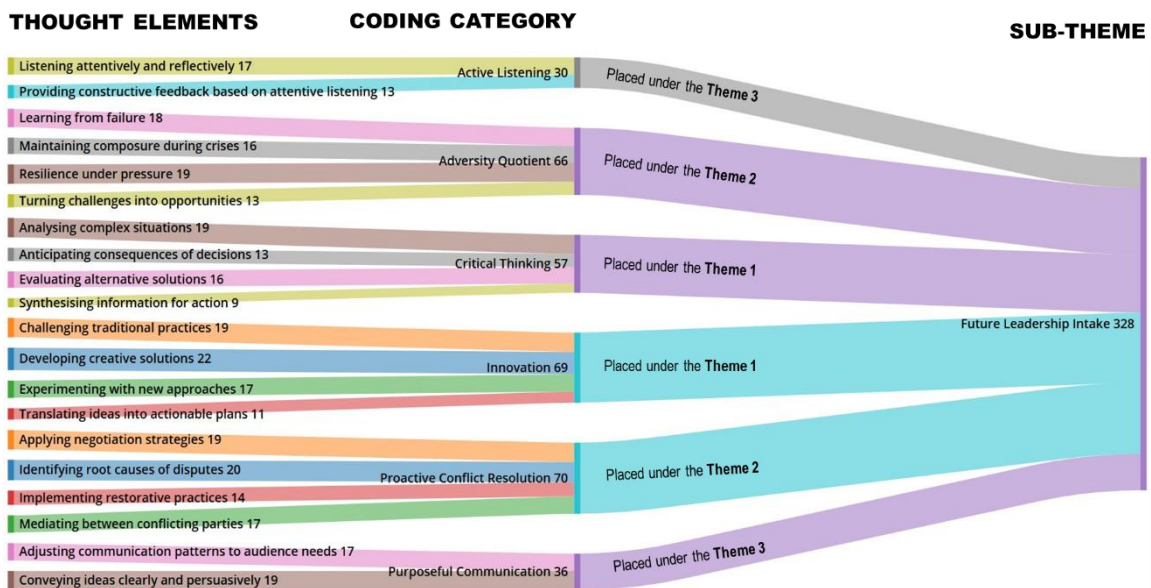
FIGURE 1. THE SANKEY DIAGRAM DEPICTING THE GOT POPULAR CULTURE TAKEOFF SUB-THEME



Source: Constructed by the sole author

The first shared sub-theme across themes, *The GOT Popular Culture Takeoff* (413 thought elements), captured participants' initial interpretations of leadership concepts through the GOT popular culture springboard. It foregrounded leadership as a strategic and adaptive act shaped by context, alliances, and resistance. Six major coding clusters emerged from this domain: *Planning War Strategies* (69) [Theme 1], *Promoting Change in the Realm* (82) [Theme 1], *Overcoming Resistance on Initiatives* (65) [Theme 2], *Defusing Tensions Between Houses* (62) [Theme 2], *Forging Alliances Through Charisma* (73) [Theme 3], and *Portraying the "One-with-the-masses" Persona* (62) [Theme 3]. These coding clusters collectively revealed that participants viewed leadership as inherently political and tactical, mirroring the manoeuvrings of GOT characters navigating volatile alliances and moral ambiguity.

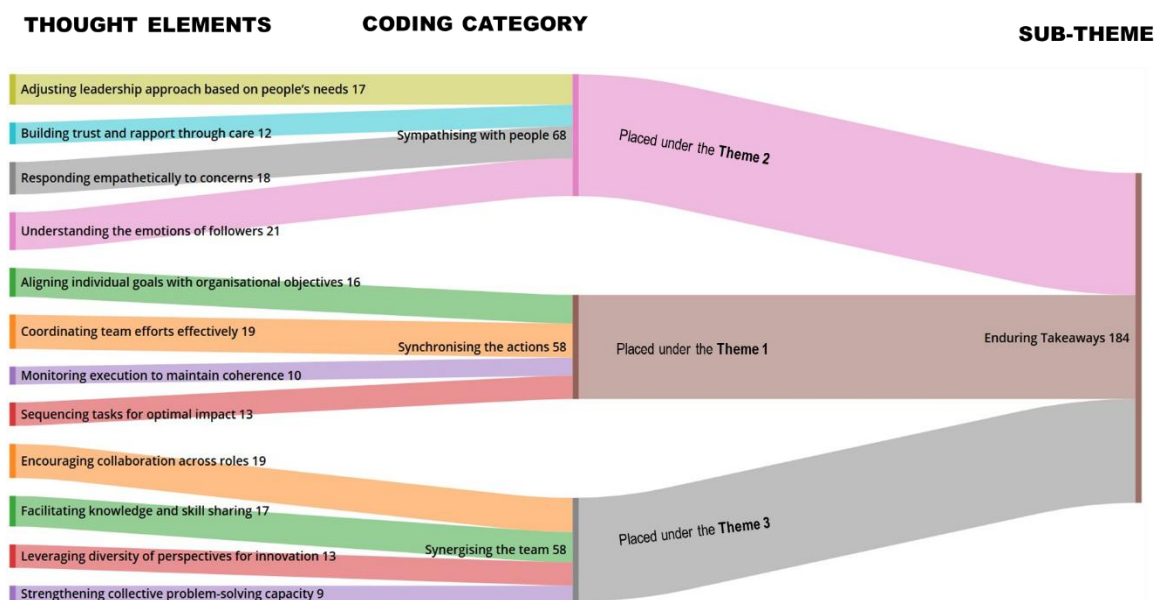
FIGURE 2. THE SANKEY DIAGRAM DEPICTING THE FUTURE LEADERSHIP INTAKE SUB-THEME



Source: Constructed by the sole author

The second shared sub-theme across themes, *The Future Leadership Intake* (328 thought elements), captured participants' internalisation of transferable leadership competencies reflected in the series' narrative arcs. This cluster represented the anticipatory dimension of leadership formation, centred on skills and dispositions deemed vital for future educational leaders. The emergent coding categories, *Critical Thinking* (57) [Theme 1], *Innovation* (69) [Theme 1], *Adversity Quotient* (66) [Theme 2], *Proactive Conflict Resolution* (70) [Theme 2], *Purposeful Communication* (36) [Theme 3], and *Active Listening* (30) [Theme 3], illustrated how participants translated narrative lessons into actionable insights. They drew inspiration from episodes that portrayed crisis management, moral decision-making, and relational leadership, transforming these scenes into conceptual footholds for their own developmental trajectories as future school leaders. The increasing conceptual density from these codes indicated a cognitive shift from passive spectatorship to active appropriation, demonstrating how participants critically negotiated fictional representations into real-world leadership reflections.

FIGURE 3. THE SANKEY DIAGRAM DEPICTING THE ENDURING TAKEAWAYS SUB-THEME



Source: Constructed by the sole author

The final shared sub-theme across themes, *The Enduring Takeaway* (184 thought elements), represented the culminating phase of meaning consolidation wherein participants distilled abstract insights into enduring leadership dispositions. It comprised three coding focal areas: *Synchronising the Actions* (58) [Theme 1], *Sympathising with People* (68) [Theme 2], and *Synergising the Team* (58) [Theme 3]. These encapsulated the relational and ethical dimension of leadership praxis, signifying an understanding that the sustainability of leadership effectiveness depends on harmony, empathy, and collective efficacy.

Furthermore, it should be noted that the *Future Leadership Intake* sub-theme refers to prospective leaders' anticipatory and forward-looking capacities, including foresight, strategic imagination, and preparatory action in response to emerging challenges in the educational organisation. In contrast, the *Enduring Takeaway* sub-theme captures leadership dispositions that could persist across time and contexts, such as moral consistency, relational trustworthiness, and resilience under sustained pressure. Thus, the former is concerned with

navigating what lies ahead, whereas the latter reflects the capacity to remain effective and credible despite prolonged uncertainty and change in the school setting.

TABLE 2. THE TYPOLOGY OF GAME OF THRONES (GOT) POPULAR CULTURE-DRIVEN PROPAEDEUTIC FOR SCHOOL LEADERSHIP LEARNING AMONG FILIPINO GEN Z IN-SERVICE TEACHERS

Major Thematic Area	Overarching Sub-components of the Thematic Areas (Shared Sub-themes)		
	The GOT Popular Culture Takeoff	The Future Leadership Intake	The Enduring Takeaway
(1) The <i>Logistics of School Leadership</i>	Planning war strategies; Promoting change in the Realm*	Critical Thinking; Innovation	Synchronising the actions
(2) The <i>Politics of School Leadership</i>	Overcoming the resistance on initiatives; Defusing tensions between Houses**	Adversity Quotient; Proactive Conflict Resolution	Sympathising with people
(3) The <i>Rhetorics of School Leadership</i>	Forging alliances through charisma; Portraying the ‘One-with-the masses’ Persona	Purposeful Communication; Active Listening	Synergising the team

\*Realm – A terminology in GOT that denotes the kingdom

\*\*House – A terminology in GOT that represent a noble (greater or lesser) family

Source: Constructed by the sole author

In tracing how these shared sub-themes intersected with the study’s major themes, a clear mapping emerged (Table 2). Codes under *Planning War Strategies* and *Promoting Change in the Realm* (from *The GOT Popular Culture Takeoff*); *Critical Thinking* and *Innovation* (from *The Future Leadership Intake*); and *Synchronising the Actions* (from *The Enduring Takeaway*) were aligned with the *Logistics of School Leadership*, signifying strategic and operational competencies necessary for educational governance. The *Politics of School Leadership* theme encompassed codes such as *Overcoming Resistance on Initiatives*, *Defusing Tensions Between Houses*, *Adversity Quotient*, *Proactive Conflict Resolution*, and *Sympathising with People*, denoting the intricate balancing of power, diplomacy, and emotional intelligence in managing institutional and interpersonal challenges. Meanwhile, the *Rhetorics of School Leadership* theme was constituted by *Forging Alliances Through Charisma*, *Portraying the “One-with-the-masses” Persona*, *Purposeful Communication*, *Active Listening*, and *Synergising the Team*, highlighting leadership as a meaningful and relational enterprise underpinned by charisma, collaboration, and communicative clarity.

### 3.7. The Trustworthiness and Rigour

The study ensured trustworthiness through adherence to Lincoln and Guba’s (1985) criteria of credibility, transferability, dependability, and confirmability, and was further guided by the COREQ checklist (Tong et al., 2007) to enhance transparency and methodological rigour. Credibility was established through prolonged engagement with participants and member-checking, allowing them to review and clarify interview transcripts, coding decisions, and theme finalisations to ensure accurate representation of their perspectives. Transferability was addressed by providing rich, contextualised descriptions of the participants, their educational

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settings, and their engagement with GOT, enabling readers to assess the applicability of findings to similar contexts. Dependability was maintained through a detailed audit trail documenting each stage of data collection, coding, and thematic development, while adherence to COREQ standards ensured definitive reporting of research team characteristics, study design, and data analysis procedures. Confirmability was enhanced through reflective journaling by the researcher and peer debriefing, ensuring that interpretations were grounded in the data rather than researcher preconceptions. Collectively, these strategies reinforced the rigour and integrity of the study, ensuring that the emergent typology of leadership learning propaedeutics authentically reflects participants' reflective engagement and interpretive insights.

## 4. Results and Discussion

The rich and nuanced individual and collective narratives generated in this study culminated in the *Typology of GOT Popular Culture-driven Propaedeutic for School Leadership Learning among Filipino Gen Z in-service teachers*. This typology shows how participants interpreted and internalised leadership concepts before formally taking on leadership roles. The resulting typology highlights three (3) interconnected domains, *Logistics*, *Politics*, and *Rhetorics of School Leadership*, which participants identified as critical areas for development as emerging school influencers. These thematic areas work through familiar GOT episodes, images, and symbols as their *Takeoff* points, guiding participants to identify specific leadership *Intakes* they can develop while awaiting formal leadership roles. These experiences culminate in an enduring overall *Takeaways* that participants are encouraged to embrace throughout their time in the organisation (See Table 2). Collectively, the typology underscores an overarching insight: that proactive engagement with these preparatory leadership lessons allows Gen Z teachers to cultivate awareness, strategic thinking, and relational acumen, laying a foundation for future formal leadership role readiness within their respective educational organisations.

### 4.1. The Exposition of Theme 1: *The Logistics of School Leadership*

In the first theme, the participants consistently highlighted that strategic planning, tactical foresight, and problem-solving, as depicted in GOT, resonate strongly with their emerging understanding of school leadership. The first theme foregrounds participants' interpretations of leadership as the management of systems, routines, and resource-dependent decisions that sustain everyday school functioning. Unlike the second theme, *The Politics of School Leadership*, which centres on power relations and strategic alliances, and third theme, *The Rhetorics of School Leadership*, which emphasises persuasion and symbolic communication, this theme is grounded in operational reasoning and pragmatic judgement. Participants drew on GOT narratives depicting supply management, succession planning, crisis response, and coordination under constraint, using these storylines to reflect on timetable structuring, workload distribution, and policy enactment in schools. The theme thus captures leadership learning as procedural sensemaking, where competence is measured by foresight, organisation, and the capacity to align limited resources with institutional goals rather than by influence or discursive skill.

Scenes depicting war councils, alliances, and counterstrategies vividly illustrated how characters' decisions, both actions and inactions, carry long-term consequences, reinforcing the importance of meticulous planning. As one participant reflected: "*I always reminisce about the characters' discussions in the war councils and rooms. Every time I think of those scenes,*

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particularly when Queen Daenerys Targaryen was assessing how to succeed in her cause, I realise that every move must be properly planned or everything will fall” (P3). Similarly, Lord Tyrion Lannister’s orchestration of the defence of King’s Landing during the Battle of Blackwater Bay (Season 2, Episode 9, “Blackwater”) demonstrated that even under intense scrutiny and doubt, effective leaders can leverage resources strategically and take calculated risks. A participant noted: “Lord Tyrion’s planning during the Battle of Blackwater Bay taught me that leadership is not just about position, but about anticipating outcomes and preparing even when others doubt your capacity” (P6).

Beyond strategic foresight, participants emphasised critical thinking, adaptability, and proactive change as essential preparatory leadership skills. While still acclimatising to their roles as teachers, they recognised that organisational challenges inevitably increase in complexity over time. One participant stated: “I am already a critical thinker as a classroom teacher. But I believe that I will develop my critical thinking skills even further before I handle leadership positions” (P5). GOT episodes such as future Night’s Watch Lord Commander Jon Snow defending the Wall against the Wildlings (Season 4, Episode 9, “The Watchers on the Wall”) and leading the Battle of the Bastards (Season 6, Episode 9, “Battle of the Bastards”) exemplify resilience and the capacity to unify diverse teams under high-stakes conditions, highlighting the need for courage and coordination. As P7 observed: “Witnessing the Night’s Watch member Jon Snow take charge at the Wall made me realise that leadership requires both bravery and the ability to unite people under a shared purpose.” Likewise, Khaleesi Daenerys Targaryen’s diplomatic negotiations with the Dothraki (Season 1, Episode 10, “Fire and Blood”) and her campaigns in Slaver’s Bay (Season 3, Episodes 4–10, “And Now His Watch Is Ended” to “Mhysa”) emphasised ethical persuasion and vision alignment as key leadership skills.

Moreover, the participants also recognised the value of observational learning and situational awareness. Lady Sansa Stark’s political navigation of Winterfell’s future, particularly in Season 6, Episode 9, “Battle of the Bastards” and Season 7, Episode 7, “The Dragon and the Wolf”, and Lady Arya Stark’s adaptive journeys, notably in Season 6, Episode 5, “The Door” and Season 7, Episode 4, “The Spoils of War”), emphasised that leaders must exercise patience, assess evolving contexts, and continually develop personal competencies to concretise logical acumen. One participant reflected: “Lady Sansa Stark’s approach taught me that sometimes leading effectively requires listening first, observing carefully, and then acting decisively” (P9), while another noted: “Lady Arya’s journey reminded me that leadership is not static; one must continually adapt and develop skills to meet changing circumstances” (P10).

Furthermore, the participants highlighted the importance of discernment in applying creative initiatives and rallying followers around a unified vision, akin to the coordinated actions of kings, queens, and commanders in GOT. As P4 explained: “There are several things that I want to change and implement in our school. Like most successful scenarios in GOT, I need to discern where my creative ideas are applicable. I plan to learn more about it”, while P1 emphasised: “Leadership is a game of compelling people to believe and support your cause. Similar to the roles the king, queen, lord, ladies, and commanders have been playing throughout the GOT series... with the aid of the GOT show, I could reflect on it more even before I started doing such activities.”

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Collectively, the *Logistics of School Leadership* theme demonstrates how GOT's rich narrative and symbolic repertoire, grounded in identifiable episodes, fosters strategic thinking, critical analysis, adaptability, and sound decision-making, forming a foundational propaedeutic platform for Filipino Gen Z in-service teachers as they prepare to assume future leadership roles within educational organisations.

#### 4.2. The Discussion of Theme 1

This case study yielded the *Typology of GOT Popular Culture-driven Propaedeutic for School Leadership Learning* among Filipino Gen Z in-service teachers, encapsulating the preparatory pathways through which participants could derive early insights into leadership before formally assuming positions of influence. Within this underpinning, the *Logistics of School Leadership* theme reflects the participants' orientation toward developing a systematic approach to organisational influence, emphasising deliberate planning, critical reasoning, and strategic foresight.

The participants drew extensively from the symbolism of war rooms and council meetings depicted in GOT (HBO, 2011–2019), noting how these strategic assemblies exemplify structured decision-making during moments of armed conflict or rebellion. Such depictions resonate with classical notions of strategy, akin to Sun Tzu's *The Art of War*, which continues to inform leadership development by instilling principles of tactical planning and measured execution (Dimovski et al., 2012). In contemporary organisations, planning remains a foundational pillar for effective initiative implementation, ensuring coherence, alignment, and efficiency in achieving objectives (Caillods, 2015).

For the participants, the war room is not merely a narrative artefact but a cognitive springboard for cultivating critical thinking. Engaging with these scenes, they reflected on the necessity of anticipating consequences and evaluating potential courses of action before committing to decisions, recognising that critical thinking mitigates irreversible errors that may adversely affect stakeholders (Ay et al., 2015; Sonmez-Cakir & Adiguzel, 2020). They acknowledged that developing these cognitive faculties is a preparatory endeavour that can and should begin even before formal leadership responsibilities are assumed, particularly as the outcomes of contemporary educational organisations become increasingly complex and high-stakes (Mahapatra et al., 2022).

Another salient facet identified by participants is the promotion and management of organisational change, as dramatised in the shifting allegiances, reforms, and policy decisions across Westeros. Change, although potentially resisted by those unprepared, is essential for organisational responsiveness and sustainability (Fusch et al., 2020). Through reflecting on these narrative episodes, participants recognised the importance of understanding the implications of implementing change and the necessity of strategically aligning initiatives to minimise disruption and maximise acceptance (Ozkan & Solmaz, 2015).

Finally, these narrative takeoff points fostered a deeper appreciation of innovation and proactive problem-solving. By observing how GOT characters adapt to dynamic circumstances, the participants acknowledged that cultivating inventive dispositions is indispensable for contemporary educational leadership, enabling leaders to respond strategically to rapid technological and societal shifts (Serdyukov, 2017). Moreover, this reflective engagement underscored the significance of rallying followers through coordinated, collaborative actions;

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an essential aspect of Gen Z leadership identity, characterised by vocal advocacy, collective reasoning, and participatory engagement (Olaskoaga-Larrauri et al., 2022; Racolța-Paina & Irini, 2021; Schroth, 2019).

### **4.3. The Exposition of Theme 2: *The Politics of School Leadership***

The second theme is analytically distinct in its focus on power, influence, and relational manoeuvring within organisational life. In contrast to the first theme, *The Logistics of School Leadership*, which prioritises functional execution, and third theme, *The Rhetorics of School Leadership*, which centres on communicative framing, this theme attends to how leadership is negotiated through alliances, conflict, loyalty, and moral compromise. Participants interpreted Westerosi power struggles as mirrors of school-based dynamics involving hierarchy, informal authority, stakeholder resistance, and competing interests. These interpretations were consistently anchored in participants' reflections on navigating departmental politics, leadership succession, and decision-making under scrutiny. The theme therefore positions leadership learning as strategic sensemaking, where effectiveness emerges from reading contexts, managing tensions, and exercising judgement within complex human systems.

In the purview of the participants, while moments of peace and prosperity are quite rare in the world of GOT, the participants recognised that its overlapping plots, captured through enduring popular culture narratives, illustrate the inevitable friction among allies and the opposition from adversaries. They understood that leaders often encounter resistance, particularly when challenging long-held beliefs and routine practices. As one participant explained, Lord Eddard Stark's experience as Lord of Winterfell and Hand of the King to Robert Baratheon exemplified how integrity and moral conviction often invite defiance, especially in politically charged environments. *"He is an honourable leader, but he received various forms of defiance during his time in the capital. No matter what you say or do, people will be against you"* (P7). Another participant added that Lord Eddard's story reminded them that *"...integrity sometimes invites conflict; in schools, standing by what's right may not always be popular, but it is necessary"* (P3). This insight was vividly portrayed in Season 1, Episode 7, "You Win or You Die", where Lord Eddard attempted to navigate court intrigues, only to be betrayed by those he trusted. For participants, this scene mirrored the ethical tensions school leaders face when balancing institutional mandates with moral duty, emphasising that leadership inevitably requires moral stamina in the face of dissent.

Responding effectively to such challenges emerged as a competency participants intend to cultivate before assuming formal leadership roles. They recognised that fortifying one's resolve and developing resilience are crucial for navigating future adversities. As one noted, *"We may be way ahead of our time in receiving actual leadership, but the administrators should also consider the possibility that we must learn how to endure the pains of leading and managing teachers. We should learn to be firm since people admire courage and respect determination"* (P9). Another participant related this to Lord Tyrion Lannister's experience in the Battle of Blackwater (Season 2, Episode 9), observing that *"...even when Lord Tyrion was doubted, he still showed courage and strategic brilliance. It's like when young leaders are underestimated but still have to prove their capacity"* (P2). For these participants, Lord Tyrion Lannister's combination of humility and resolve represented the kind of adaptive confidence needed to manage scepticism and perform under pressure; traits they aspired to embody as future school leaders.

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Similarly, participants reflected on inter-House conflicts as metaphors for the realities of organisational disputes. The long-standing enmity between House Stark and House Lannister (Season 1, Episodes 5–10, “The Wolf and the Lion” to “Fire and Blood”) and the intense clash between House Stark and House Bolton in the “Battle of the Bastards” (Season 6, Episode 9) illustrated for them the centrality of timely intervention and stabilisation in leadership. One participant noted that “...we all remember the conflict between House Stark and House Lannister, as well as the conflict between House Stark and House Bolton, because of their epic fight scenes and intriguing storylines. Such scenes are relevant to learning more about being a leader since these quarrels among teachers and factions do happen” (P8). Another explained that, like former Night’s Watch Lord Commander Jon Snow during the Battle of the Bastards, “A leader must decide quickly when disagreements spiral out of control. Delaying action only worsens division” (P10). These reflections suggested that while institutional politics can escalate, effective leaders act decisively to mediate tensions and prevent further fragmentation within the team.

Through these discussions, participants acknowledged the importance of early exposure to conflict resolution strategies. While formal models of mediation and negotiation can be introduced later as capacity-building measures, they believed that contextual understanding, especially when anchored to culturally familiar narratives, builds intuitive readiness. As P12 articulated, “We can always read about conflict resolution strategies once we are already leaders, but it can never replace the kind of knowledge and expertise that we can muster from learning about it quite early. Various types of conflict are recognisable in GOT.” This was echoed by another participant who reflected that “...even the smallest misunderstandings among characters in GOT grew into wars. It reminds me that in schools, unresolved issues between teachers or departments can also escalate if not managed early” (P5). Such insights highlighted how participants were beginning to appreciate leadership as an anticipatory act, one that involves diagnosing tensions before they expand into institutional crises.

Furthermore, the participants underscored the value of empathy and relational awareness in addressing resistance and fostering reconciliation. GOT repeatedly illustrates that the success or failure of leadership is inseparable from human agency, as seen in Lady Sansa Stark’s negotiation with Lord Petyr ‘Littlefinger’ Baelish in Season 7, Episode 7, “The Dragon and the Wolf”. One participant reflected that “...we cannot remove the people element from every leadership scenario. Looking back at GOT, every success and problem can be attributed to a person. Things will become manageable if you have people with acumen or relational skills. I must actively learn how to use sympathy to understand my future followers” (P6). Another added that “Lady Sansa showed that empathy doesn’t mean weakness; it’s about reading people’s motives and guiding them toward unity, even when trust has been broken” (P1). For these participants, relational intelligence, expressed through empathy, discretion, and timing, was recognised as the emotional core of political leadership in schools, distinguishing coercive authority from moral influence.

Taken together, the *Politics of School Leadership* theme demonstrates that GOT provides Filipino Gen Z in-service teachers with a narrative-based lens for interpreting power dynamics, resistance, and negotiation within organisations. By internalising these lessons early, participants cultivate resilience, foresight, and emotional intelligence; qualities that prepare

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them to navigate the intricate political realities of educational leadership while remaining grounded in integrity and care.

#### 4.4. The Discussion of Theme 2

The participants' preliminary understanding of school leadership, as derived from GOT (HBO, 2011–2019), coalesced into the *Politics of School Leadership* theme, highlighting the importance of mindful governance and the ability to manage tension-filled, conflict-prone situations; skills they recognised as essential for future leadership. Bolman and Deal (2008) noted that the political frame of leadership involves transforming undesirable circumstances into opportunities while mitigating divisive outcomes. Anchoring their reflections on the character of Eddard Stark, the Lord of Winterfell, participants identified a wealth of leadership lessons embedded in his honourable yet politically fraught trajectory. They collectively emphasised that even well-intentioned initiatives are often met with defiance and opposition, echoing Ford and associate's (2021) observation that leadership is inherently marked by resistance.

Through this narrative lens, participants acknowledged that a critical preparatory task is developing the resilience and resolve to navigate criticisms and opposition effectively before assuming formal leadership roles. As Widodo and colleagues (2022) argue, contemporary leaders require a well-honed adversity quotient alongside intelligence and emotional competence to manage organisational challenges. Gen Z teachers, in particular, are expected to cultivate skills for navigating complex relational dynamics, negotiating resistance, and responding to obstacles with poise (Töröcsik et al., 2014).

The participants further reflected on the recurring inter-House tensions and political manoeuvres in GOT as instructive exemplars of organisational discord and its management. These plots illuminated the need for proactive conflict resolution to preserve harmony and maintain institutional stability. As Harms and collaborators (2017) suggest, understanding and alleviating tensions is an essential competency in today's unpredictable organisational climate. For Gen Z school leaders, this entails learning to mediate generational divides and resolve disputes with strategic foresight.

In recognising these narrative takeoff points, participants identified the necessity of developing conflict management strategies and adopting a 'reframing and rehumanising' stance (Nan, 2011, p. 240) when engaging with contentious situations. Central to school leadership and organisations is the ability to navigate opposing perspectives and conflicting personalities (Saleh et al., 2025). While prior conflict resolution research has focused predominantly on previous generations of school leaders (Bhayana et al., 2021), the unique context of Gen Z necessitates proactive, empathetic, and context-sensitive approaches to leadership.

Ultimately, the theme posits that while organisational tensions and interpersonal conflicts are inevitable, effective leadership requires the cultivation of empathy, resilience, and strategic acumen. Participants recognised that developing an adversity quotient, learning conflict resolution, and exercising sympathy are not optional but foundational for shaping a leadership style capable of sustaining influence, fostering collaboration, and guiding stakeholders towards shared organisational goals (Holt & Marques, 2011; Kock et al., 2019).

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#### 4.5. The Exposition of Theme 3: *The Rhetorics of School Leadership*

The last theme highlights leadership as an act of meaning-making through language, symbolism, and narrative persuasion. Unlike the first theme, *The Logistics of School Leadership*, which is concerned with execution, and the second theme, *The Politics of School Leadership*, which centres on power negotiation, this theme emphasises how leaders shape belief, legitimacy, and collective direction through discourse. Participants drew on iconic episodes in GOT to examine how authority is constructed, challenged, or sustained through words and performative acts. These interpretations were explicitly connected to school contexts involving vision-setting, motivational communication, and ethical positioning. The theme thus frames leadership learning as discursive sensemaking, where influence is exercised through credibility, clarity, and the capacity to align narratives with shared values.

The participants highlighted the strategic cultivation of networks and alliances as a pivotal leadership lesson from GOT. While every character operates with vested interests, the ability to secure support consistently determined the success of their ventures. They perceived charisma as a vital trait for leaders, enabling them to manage diverse teams and unify multiple stakeholders. As one participant stated: *“If you look into various characters in the GOT series, no other character does the role of an actual leader oozing with charisma like Lord Tyrion Lannister. ...he understood the need for alliances and allegiances. That is real leadership!”* (P10). Another participant added that Lord Tyrion’s approach demonstrated that *“...charisma does not mean manipulation but the art of being heard and respected despite limitations”* (P5). Indeed, Lord Tyrion’s deft negotiation with Lord Varys’s network in Season 2, Episode 9, “Blackwater,” and his political manoeuvring at King’s Landing in Season 4, Episode 10, “The Children,” exemplify how charisma, coupled with strategic thinking, enhances a leader’s influence over a diverse constituency.

Additionally, the participants also recognised the necessity of effective communication and presence, especially in a generation accustomed to digital correspondence. They reflected on the importance of conveying clarity and vision, not merely echoing prevailing sentiments. As P11 observed: *“We must know how to communicate with the teachers under us, our fellow leaders, and higher school authorities. As I reflect on GOT, I realise how an authority figure's choice of words can make a difference in the clarity of a marching order to subordinates and the overall success of what he has in mind.”* P2 reinforced this insight by noting that *“...leadership now is not only about the message but how it is said—tone, empathy, and consistency matter, as seen in Queen Daenerys Targaryen’s speeches that inspire loyalty despite uncertainty.”* This lesson was illustrated in Season 1, Episode 10, “Fire and Blood,” when Queen Daenerys Targaryen addresses her followers in Slaver’s Bay, demonstrating that eloquence and transparency are central to earning trust and motivating action.

The importance of connecting with the grassroots also emerged as a critical dimension of leadership. Participants contrasted characters like future Night’s Watch Lord Commander Jon Snow (Season 5, Episode 8, “Hardhome”) and Queen Daenerys Targaryen (Season 3, Episode 4, “And Now His Watch Is Ended”) with King Stannis Baratheon (Season 5, Episode 10, “Mother’s Mercy”) and Queen Cersei Lannister (Season 6, Episode 10, “The Winds of Winter”), noting that successful leaders demonstrated empathy and attentiveness to their followers’ needs, while less effective ones remained isolated or authoritarian. As P6 articulated: *“I am sure our generation will find resonance from characters like King Jon Snow and Queen*

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*Daenerys Targaryen. They understood other people's plights, so the people follow them. Now, think of King Stannis Baratheon and Queen Cersei Lannister. They failed as leaders because the people do not understand them.”* P3 expanded on this by reflecting that “...*empathy in leadership is not weakness; it is strategic awareness of what people feel and think, which determines whether they will walk with you or against you.”*

Furthermore, the participants also underscored the role of active listening in informed leadership. Scenes such as Lord Tywin Lannister advising King Tommen Baratheon (Season 4, Episode 10, “The Children”) emphasised that wisdom stems from attentive listening and responsiveness. As P9 reflected: “*King Tommen was about to ascend the throne upon the death of his king brother. Lord Tywin explained that good kings are holy, just, and strong, but he realised that wise kings listen to others. Like King Tommen, we do not know many things in the school. We should listen more. What is the point in learning leadership if you do not know how to listen?”* Similarly, P7 remarked: “*Listening is not submission; it is understanding. Lord Tywin’s advice to King Tommen shows that authority without ears is just ego. That lesson matters in schools where communication gaps cause most conflicts.”*

Finally, participants recognised that leadership extends beyond authority and personal ambition, requiring intentional efforts to foster synergy and cohesion within teams. They acknowledged the necessity of connecting with others, appreciating diversity, and cultivating collaboration to achieve collective goals. As P4 emphasised: “*A generation that usually prefers to work alone must definitely make many adjustments to connect well with others. ...we need to open ourselves to other people, tolerate individual differences, and find our common ground to learn how to create a vibrant team.”* Complementing this, P1 added: “*Think of the Night’s Watch after Lord Commander Jon Snow’s return. Their strength was never about rank but about trust and cooperation. That’s how school leadership should feel: shared survival through shared purpose.”*

In essence, the *Rhetorics of School Leadership* theme demonstrates that GOT narratives provide Filipino Gen Z in-service teachers with a propaedeutic understanding of leadership through charisma, effective communication, empathetic engagement, and team cohesion. By internalising these lessons early, participants are better prepared to influence, connect, and lead effectively within complex educational environments.

#### **4.6. The Discussion of Theme 3**

Analysing GOT through the lens of preparatory leadership learning inductively generated the *Rhetorics of School Leadership* theme. Participants consistently highlighted the pivotal role of forging alliances and establishing connections with rank-and-file personnel as foundational to enhancing their communication and active listening skills as emerging school leaders. Effective communication and listening were identified as critical leadership facets for mitigating dissonance and fostering cohesion among followers (Longweni & Kroon, 2018; Saraih et al., 2022). The participants anchored their reflections on Lord Tyrion Lannister, the morally ambiguous yet strategically astute character, as a propaedeutic exemplar of charisma and relational influence. They asserted that charisma, particularly in alliance-building, constitutes a necessary skill for Gen Z leaders to navigate complex organisational landscapes, an aspect currently underexplored in leadership literature.

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The participants also noted that securing alliances within an organisation must be complemented by developing practical communication skills, which underpin trust, rapport, and collaborative productivity (Musheke & Phiri, 2021). As digital natives, Gen Z teachers rely heavily on virtual connectivity, yet they acknowledged the indispensable value of face-to-face relational acumen to complement their technologically mediated interactions (Tankovic et al., 2022). Furthermore, participants drew leadership lessons from the contrasting depictions of characters such as Lord Commander/King Jon Snow and Queen Daenerys Targaryen, whose capacity to engage and empathise with their constituents exemplifies effective people-oriented leadership. Conversely, King Stannis Baratheon and Queen Cersei Lannister illustrated the pitfalls of disconnecting from followers, highlighting the consequences of neglecting relational responsibilities (Gonfa, 2019).

Crucially, participants recognised that active listening is a linchpin for maintaining follower engagement and enhancing decision-making, echoing Mackey and collaborator's (2018) assertion that detachment compromises leaders' capacity to intervene appropriately in work-related grievances. The integration of these takeoff points enabled participants to appreciate the significance of team synergy as a preparatory skill, even before formal leadership assumption. Contemporary educational institutions, with their structured regimens, require leaders who can harmonise collaborative efforts, thereby alleviating workloads and enhancing collective efficacy (Sanyal & Hisam, 2018). Gen Z teachers, though still prospective leaders, exhibited an awareness of collaborative dynamics, aligning with literature that identifies them as inherently cooperative and relationally attuned (Bencsik et al., 2016).

In sum, the theme underscores that developing charisma, communication skills, active listening, and team synergy constitutes an essential preparatory repertoire for aspiring Gen Z school leaders, providing a practical foundation from which to cultivate influence, relational competence, and strategic impact in complex organisational environments.

## **5. The Researcher's Reflexivity**

In conducting this qualitative case study, the researcher maintained an ongoing process of reflexivity to account for the potential influence of personal engagement with GOT and ASOIAF on the interpretation of participants' experiences. While the researcher is both a viewer of the series and a reader of the books, which provided familiarity with the narrative, characters, and thematic arcs, measures were intentionally adopted to mitigate confirmation bias and ensure analytic rigor. These included adhering closely to participants' verbatim accounts and maintaining reflective memos to interrogate assumptions arising from prior knowledge of the GOT universe. Additionally, the researcher remained attentive to instances where personal interpretations could overshadow participants' perspectives, striving to privilege the participants' lived experiences over preconceptions. Moreover, for the interest of disclosure, the researcher is affiliated with the Philippine educational sector and holds experience as a published author and active peer reviewer in prestigious journals, with a particular focus on qualitative research methodologies, which informs the contextualisation and interpretation of the data. By maintaining this reflexive posture throughout data collection, coding, and thematic development, the study aimed to uphold the integrity and trustworthiness of the findings, ensuring that insights into the propaedeutic dimensions of leadership were grounded in participants' accounts rather than the researcher's familiarity with the popular culture content.

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## 6. Conclusion

Scholars have argued that leadership learning and preparation theories and models that proved effective for previous generations of leaders do not necessarily guarantee efficacy for subsequent cohorts (Anderson et al., 2017). Consequently, it is imperative to identify approaches that address the distinctive sensibilities, values, and expectations of prospective leaders from Gen Z (Demirbilek & Keser, 2022). In this context, aspects of GOT popular culture provided a compelling springboard for exploring the preliminary leadership understanding, offering insights into the competencies and mindsets that Gen Z in-service teachers should cultivate as future school leaders. From these focal points, the study advances its theoretical contributions, practical implications, limitations, and directions for future research.

### 6.1. Theoretical Contributions

This study makes three significant theoretical contributions. First, whereas much of the extant scholarship has prioritised school leadership learning and preparation for millennial managers in anticipation of the impending retirement of prior generations' leaders and managers (Obmerga, 2024; Easton & Steyn, 2022), this inquiry uniquely focuses on the emergent Gen Z cohort, unpacking the school leadership learning domains that resonate most profoundly with their experiences and perceptions. Second, it addresses a notable gap in the literature by exposing the foundational parameters that Gen Z teachers should understand and progressively internalise as prospective leaders derived from the reflections of twelve participants from distinct educational institutions across the Philippines, synthesised with relevant literature and interpreted through the author's analytical lens. However, by virtue of the study's qualitative case study methodology, these findings offer only an indirect and partial insight into what these competencies are and how they may be developed. Third, the study introduces the *Typology of GOT Popular Culture-driven Propaedeutic for School Leadership Learning* among Filipino Gen Z in-service teachers, presenting a provocative lens that captures an unfiltered yet potent appreciation of leadership. This framework illuminates how informal cultural artefacts can serve as an initial incubator for leadership cognition and skill development, unmediated by formal training or pre-existing institutional biases.

### 6.2. Practical Implications

This inquiry yields practical implications anchored in the *Typology of GOT Popular Culture-driven Propaedeutic for School Leadership Learning* among Filipino Gen Z in-service teachers. These practical implications may hold particular value for Gen Z educators, regardless of disciplinary specialisation, who seek to develop a deeper understanding of school leadership, as well as for Gen Z teachers who are increasingly being identified and prepared within emerging school leadership pipelines. First, the *Logistics of School Leadership* theme underscores the importance of cultivating critical thinking and innovation. By reflecting on the popular culture takeoff points of planning war strategies and promoting change in the realm, Gen Z teachers can proactively synchronise their actions, experiment with strategic initiatives, and refine their problem-solving acumen even before assuming formal leadership roles. Second, the *Politics of School Leadership* theme highlights the necessity of developing an adversity quotient, conflict resolution skills, and the capacity for sympathy. Engagement with GOT narratives involving overcoming resistance on initiatives and defusing tensions between Houses equips emerging leaders to navigate opposition, anticipate organisational frictions, and relate

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meaningfully to their colleagues, thus fostering a resilient and empathetic leadership approach. Third, the *Rhetorics of School Leadership* theme stresses the cultivation of effective communication, active listening, and team synergy. By examining character-driven lessons in forging alliances through charisma and portraying the ‘*One-with-the-masses*’ Persona, Gen Z in-service teachers can learn to connect with followers, establish rapport, and harmonise diverse viewpoints, thereby enhancing collective performance and cohesion within their educational institutions. Collectively, the typology can inform the design of skills and career development programmes for graduating teacher education students and newly inducted in-service teachers by deliberately highlighting key leadership competencies and reflective entry points for sustained professional and leadership growth. Furthermore, it may be applied within classroom settings, especially prior to the culmination of the baccalaureate degree stint of such educators, to inculcate a glimpse of leadership development through guided pre-engagement with familiar narratives and early onset experiential learning activities.

### **6.3. Limitations and Future Research Directions**

The single-case study design enabled participants to articulate and clarify the participants’ perspectives and positionalities of the preparatory avenue for school leadership derived from GOT popular culture. Nonetheless, the inquiry was inherently constrained by limitations typical of qualitative case study research, including intersubjective responses, a small and purposively selected sample, and findings that are not generalisable beyond the study context (Creswell & Creswell, 2018). While measures such as memoing, conformity to the COREQ guidelines, and being mindful to the researcher’s reflexivity were implemented to enhance trustworthiness and rigour, the interpretations remain bounded by the experiences and vantage points of the twelve participants. Furthermore, the scope of GOT popular culture considered was selective; other narrative arcs, subplots, or character portrayal interpretations with the GOT series may evoke alternative sensemaking of leadership learning propaedeutics, thereby limiting the extent of the already moderate generalisation.

Future research could expand and diversify this inquiry by employing alternative qualitative methodologies, such as metaphor analysis, portraiture, or cross-case studies, to capture broader dimensions of Gen Z in-service teachers’ informal leadership preparation or leadership learning. Future studies may also consider focus group discussions, as the primary interview protocol, to further explore cultural narratives and co-construction of meaning among the participants. Subsequent investigations may also explore other popular culture avenues, such as the Marvel Cinematic Universe (MCU), which presents accessible leadership exemplars while reducing exposure to adult-themed content (Schmidt & Islam, 2022). Moreover, the integration of Artificial Intelligence features in research design and data collection and analysis presents an unprecedented opportunity to synthesise textual, visual, and audiovisual elements from popular culture, enabling richer coding schemes, thematic analyses, and pattern recognition across larger datasets. Finally, these findings could underpin sophisticated quantitative approaches, including scale development and model testing, to further operationalise the propaedeutic leadership learning among Gen Z in-service teachers, offering a methodologically pluralistic lens on their emerging conquest in school leadership.

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Data supporting the conclusions of this study can be made available upon reasonable request from the corresponding author.

### **AI Use**

AI tools (Grammarly, Gemini, and ChatGPT-5) were used only for linguistic and stylistic support. No AI system was used to generate original scientific claims, data, or interpretations, which remain entirely those of the author.

### **Ethics Statement**

Participation in the interviews was voluntary and based on informed consent. All responses were collected anonymously, and no personally identifiable information was recorded. Participants were informed about the purpose of the study and their right to withdraw at any time. The study complied with standard ethical guidelines for social science research.

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# GILE Journal of Skills Development

## The Role of Motivational Disposition in EFL University Students' Willingness to Communicate in English in Hungarian Higher Education: A Pilot Questionnaire Study

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### Abstract

Globalization and the spread of English as a global lingua franca have shifted second language (L2) motivation research toward learners' self-concept and identity (Dörnyei, 2009; Ushioda, 2011). The expansion of global connections has increased the need for English proficiency and for learners' readiness to use the language in academic and professional settings (MacIntyre et al., 1998). Although motivation and willingness to communicate (WTC) have received considerable attention, little research has examined their relationship among Hungarian university students both inside and outside the classroom. To address this gap, a questionnaire was developed and piloted with 100 participants. The instrument is a composite of adapted and original items, as well as newly developed items derived from interview findings that preceded this questionnaire study. This paper outlines the instrument development process and aims to validate a questionnaire that measures EFL university students' motivational profiles and willingness to communicate in the Hungarian context, as well as to explore the relationship between these constructs. The results show that students' motivation is primarily associated with their Ideal L2 Self, attitudes towards the learning community, and travel orientation. Correlation analyses reveal a strong relationship between intrinsic motivation and motivated learning behaviour. Regression analyses identify Ideal L2 Self as a significant predictor of willingness to communicate, with a stronger effect outside the classroom. In the Hungarian EFL context, students reported high levels of confidence and motivation in both classroom and out-of-classroom settings; nevertheless, their WTC was even stronger outside the classroom. This pattern indicates that their engagement with English extends beyond formal instructional requirements. These findings are preliminary; however, the questionnaire shows potential for reliable measurement, while further research with larger samples remains necessary.

**Keywords:** English as a foreign language (EFL), Hungarian higher education, instrument validation; motivational disposition, pilot questionnaire study, willingness to communicate (WTC)

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## 1. Introduction

Motivation plays a central role in second and foreign language learning, as it influences learners' emotions, areas of interest, and personal goals, and it affects how much effort they are prepared to devote to learning a language (Richards, 2015). At the university level, motivation is particularly important because students are expected to take greater responsibility for their learning and to use the language in both academic and real-world contexts. For learners of English as a foreign language, motivation is also closely linked to willingness to communicate (WTC), which determines whether learners choose to use English when opportunities arise.

Within this broader research area, studies have examined various aspects of second language (L2) motivation across different educational contexts. However, research on the motivational disposition of EFL university students in Hungarian higher education remains limited, especially in the case of English majors. During the past fifteen years, only a small number of studies have focused on how motivation operates in this specific context. An additional gap concerns students whose university studies took place after the COVID-19 pandemic. This period brought major changes to higher education, as teaching moved largely to online platforms. These changes affected learning conditions in important ways and make it necessary to re-examine student motivation under current academic circumstances. A better understanding of post-COVID motivation could support the development of teaching practices and institutional policies that address present and future needs.

Second language motivation has often been examined through the L2 Motivational Self System (L2MSS). However, its relationship with individual difference variables such as willingness to communicate has received less attention. Csizér (2020) points out that the impact of L2MSS components on WTC remains under-researched. Although a large body of international research exists on both L2 motivation and WTC, studies that examine their relationship among EFL university students in Hungary are rare. This lack of context-specific research highlights the need for further investigation into how motivation influences communicative behaviour in Hungarian higher education.

Against this background, the present study aims to examine the role of motivational disposition in EFL university students' WTC in English within the Hungarian higher education context. Through this aim, the study seeks to address gaps in applied linguistics and language pedagogy by offering a clearer account of motivation and communication at the university level. The study also seeks to contribute to the field by mapping students' motivational dispositions in the post-COVID period. This focus provides a basis for the development of teaching practices that respond more effectively to current learner needs in Hungary. Examination of the relationship between motivational disposition and WTC also allows closer analysis of which dimensions of L2 motivation exert the strongest influence on students' WTC.

The questionnaire in the present study is planned to be later used as part of a larger project that aims to complement the qualitative data collected previously. The broader purpose is to deepen the understanding of EFL university students' motivation to learn English and WTC in English in the context of Hungarian higher education. This pilot study had three aims. The first aim was to assess the reliability of the constructs that measure EFL university students' motivation and WTC in English. These constructs were partly adapted from previous questionnaires and partly developed by the researcher on the basis of previously collected interview data. The second aim

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was to establish the relative importance of these constructs so that the motivational disposition of EFL university students in Hungarian higher education could be described, together with their WTC inside and outside the classroom. The third aim was to examine the relationship between EFL university students' motivational disposition and their WTC. A quantitative questionnaire was considered the most suitable tool for identifying these relationships (Dörnyei, 2007).

Despite extensive research on motivation and WTC, few studies have examined how Hungarian university students' motivational dispositions relate to their WTC both inside and outside the classroom. This study fills a clear gap by providing a systematically piloted and context-specific questionnaire that examines the relationship between motivation and WTC among EFL university students in Hungarian higher education, an area that has received limited attention. The findings could benefit researchers by offering a validated instrument for a future large-scale study, and they may support teachers and curriculum designers by providing empirical insights into the motivational profiles and communicative readiness of university-level EFL learners.

## 2. Literature Review

Motivation plays a central role in L2 learning. Motivation, as described by Richards (2015), includes learners' feelings, interests, desires, and their willingness to put effort into learning an L2. Dörnyei (2005) states that motivation helps learners deal with difficulties that arise during the learning process. Motivation shapes learners' choices and behaviour, which then affects success or failure. Successful language learning requires enthusiasm, commitment, and persistence. Even highly talented learners may fail when motivation is insufficient. Learners with low motivation often encounter more obstacles than learners with higher motivation (Dörnyei, 2005). Motivated learners usually devote more time and energy to their studies, which increases their chances of academic achievement (Richards, 2015).

L2 motivation research reflects changes associated with globalisation and the global role of English, which have reshaped how motivation is conceptualised in L2 studies. These changes have shifted attention away from integration into a target language community toward learners' self-concept and identity (Dörnyei, 2009; Ushioda, 2011). Recent L2 motivation research pays more attention to how learners imagine their future selves and how these self-images shape motivation and language development (Zhao et al., 2022). This perspective suggests that learners' future self-images strongly influence present effort and behaviour in L2 learning.

Increased global communication has also highlighted the importance of learners' readiness to use English. The expansion of global academic and professional networks has increased the need for English proficiency and learners' readiness to use the language in real communicative contexts (MacIntyre et al., 1998). MacIntyre et al. (1998) define willingness to communicate (WTC) as the readiness to initiate communication at a particular moment with specific interlocutors through a second language. This conceptualisation presents WTC as both a personal disposition and a situational response shaped by learner-related and contextual factors. WTC reflects learners' motivational readiness to engage in interaction and therefore functions as a key indicator of progress in L2 learning (Havwini, 2019; Yashima et al., 2018). Communicative competence remains a central goal in language education (Khajavy et al., 2016). Learners may still hesitate to communicate even when they possess adequate linguistic skills.

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A substantial body of work has examined different aspects of student motivation in Hungary (Bosnyák & Gáncs, 2012; Csizér & Kormos, 2008, 2009; Csizér & Lukács, 2010; Kaw, 2024; Kaw & Kálmán, 2025; Kormos et al., 2008; Stamenkovska et al., 2022). The studies report generally positive attitudes toward English and show that Hungarian learners display both intrinsic and instrumental motives, especially motives linked to future careers. English continues to hold a central place in a globalized world, and external motives such as grade expectations and exam outcomes remain influential. Learners show a strong *International Posture* and that significant others shape their motivation in clear ways (Kaw, 2024; Kaw & Kálmán, 2025). Support from significant others, especially teachers, plays a central role. A strong international posture strengthens motivation because learners view English as a path to global communication. The findings of Csizér and Kormos (2008) align with those reported by Kaw (2024) and Kaw and Kálmán (2025), although they emphasise different aspects of motivational influence. Csizér and Kormos show that international posture is closely linked to learners' *Ideal L2 Self* and reflects an internalised future-oriented motivation rather than external pressure. Kaw (2024) and Kaw and Kálmán (2025) similarly report a strong international posture among learners, while also highlighting the shaping role of significant others in motivation.

Post-pandemic research also identifies differences between online and face-to-face learning contexts. Learners tend to prefer in-person classes because these settings provide interaction and a sense of connection. Learners continue to value online learning because it offers flexibility and functions as a complementary mode of instruction. Kaw and Kálmán (2025) show that the *Ideal L2 Self*, the *Ought-to L2 Self*, and the *L2 Learning Experience* continue to exert substantial influence on motivation. Learners pursue English for instrumental purposes such as career advancement and academic success, as well as for integrative purposes related to international interaction. Since motivation represents a key factor in long-term L2 achievement (Dörnyei & Ryan, 2015; Lamb, 2017), awareness of these motivational patterns remains important for teachers who seek to adapt their practices to learners' changing needs.

Research on WTC portrays L2 communication as a complex and dynamic process. A wide range of studies describe L2 communication as influenced by linguistic, cultural, social, motivational, emotional, and pedagogical factors (MacIntyre, 2020). High WTC represents an essential condition for effective L2 development. For this reason, the promotion of WTC has become a central goal in language education (Kang, 2005; Kruk, 2022). Learners' WTC affects the quality and quantity of interaction, and this readiness emerges through both direct and indirect influences (Clément et al., 2003).

Previous research shows that WTC is influenced by a wide range of factors. Classroom atmosphere is repeatedly identified as a key influence, as supportive and positive learning environments encourage learners to use the target language more actively (Kaw, 2025; Khajavy et al., 2016; Peng, 2019). Language proficiency also plays an important role, since learners with higher proficiency levels tend to feel more confident about participating in communication (Chichon, 2019; Mahmoodi et al., 2021; Yashima et al., 2018). Perceived communicative competence further supports WTC, as learners who believe in their communicative ability are more inclined to speak (Elahi Shirvan et al., 2019; Khajavy et al., 2016). Emotional factors add another important dimension. Enjoyment can increase learners' readiness to communicate, whereas boredom can limit participation (Alrabai, 2024; Bensalem et al., 2023, 2025; Kaw, 2025; Kruk, 2022; Wang et al., 2021). WTC is also affected by online learning conditions,

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preferences for digital interaction, and broader communicative contexts (Kaw, 2025). Research shows that students' WTC in online settings varies according to comfort levels, personal preferences, and situational demands (Kaw, 2025). In Hungarian higher education, communicative needs related to employment, travel, and everyday interaction contribute to higher WTC outside the classroom. Taken together, these findings show that WTC develops through the interaction of multiple interconnected influences.

Additional learner-related factors also contribute to WTC. Interlocutors play an important role, as learners respond differently depending on who they communicate with and how group dynamics operate (Chichon, 2019; Kaw, 2025; Pawlak & Mystkowska-Wiertelak, 2015; Yashima et al., 2018). Peer interaction patterns can either encourage or inhibit participation. Personality traits also influence WTC, as some learners are naturally more inclined towards verbal interaction than others (Ghonsooly et al., 2012; Kaw, 2025; Lan et al., 2021). Topic familiarity and task characteristics affect communicative readiness, since familiar topics and clearly structured tasks reduce uncertainty (Chichon, 2019). Anxiety and self-confidence remain central factors in willingness to communicate. Higher levels of anxiety often limit learners' participation, whereas strong self-confidence supports more frequent and sustained communication (Clément et al., 2003; Elahi Shirvan et al., 2019; Hejazi et al., 2023; Peng, 2014, 2015; Wei & Xu, 2022; Yashima, 2002).

Teacher-related factors exert a strong influence on students' WTC. Teachers shape WTC through their attitudes, behaviour, and pedagogical practices (Cao & Philp, 2006; Kang, 2005; MacIntyre & Doucette, 2010; Peng, 2014). Research identifies teacher empathy and teaching style as factors that enhance learner confidence and reduce anxiety (Amiryousefi, 2018; Bui et al., 2022; Chen et al., 2021; Kaw, 2025). Teacher involvement, expressed through warmth, approachability, and enthusiasm, promotes students' readiness to communicate (Kálmán, 2021, 2023; Lamb, 2017). Pedagogical practices such as adequate response time and interactive tasks support communicative confidence (Amiryousefi, 2018; Zarrinabadi, 2014). Teachers who demonstrate care, communicate clear expectations, and encourage learner autonomy strengthen students' sense of competence and intrinsic motivation, which enhances WTC (Delos Reyes & Torio, 2021; Wang et al., 2021). Additional teacher-related influences include teacher support and teacher behaviour (Bui et al., 2022; Chen et al., 2021; Ghonsooly et al., 2012; Hejazi et al., 2023; Khajavy et al., 2016; Khajavy & Ghonsooly, 2017; Wei & Xu, 2022; Zarrinabadi, 2014).

A strong relationship between motivation and WTC has been reported across a range of educational contexts (Alrabai, 2024; Elahi Shirvan et al., 2019; Ghonsooly et al., 2012). Research grounded in the L2MSS shows consistent links between learners' motivational self-guides and their communicative readiness (Li & Liu, 2021; Öz & Bursalı, 2018; Zhou, 2022). Among these components, the Ideal L2 Self emerges as the strongest and most consistent predictor of WTC (Khajavy & Ghonsooly, 2017; Öz & Bursalı, 2018; Sadoughi & Hejazi, 2024; Wei & Xu, 2022; Zhou, 2022). By contrast, the Ought-to L2 Self shows weaker and less consistent associations with WTC, as external expectations alone appear to have a limited effect (Khajavy & Ghonsooly, 2017; Peng, 2014; Sadoughi & Hejazi, 2024; Taguchi et al., 2009; Wei & Xu, 2022; Zhou, 2022). Learning experience also contributes to WTC, together with international posture, as positive classroom experiences and openness towards international communication support learners' readiness to use the language in both academic and real-world

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contexts (Li & Liu, 2021; Mahmoodi et al., 2021; Mystkowska-Wiertelak & Pietrzykowska, 2011; Peng, 2015; Yashima, 2002; Yashima et al., 2004).

Cross-context evidence further supports the central role of the Ideal L2 self. Studies conducted in Thailand and Turkey show that learners with a strong Ideal L2 Self demonstrate higher WTC (Öz & Bursalı, 2018). Research in Korea indicates that secondary school learners with stronger Ideal and Ought-to L2 Selves report higher WTC both inside and outside the classroom, while university learners with a strong Ideal L2 Self demonstrate higher WTC across communication contexts (Lee & Lee, 2020). Studies in China also apply the L2MSS framework. Li and Liu (2021) report that Chinese university students with a strong Ideal L2 Self and positive learning experiences demonstrate higher WTC inside and outside the classroom. Their findings show no significant association between the Ought-to L2 Self and WTC.

Recent research extends this line of inquiry to additional contexts. Zhou (2022) reports positive relationships between all three components of the L2MSS and WTC, with learning experience showing the strongest association. Research in Iran highlights the role of international posture. Mahmoodi et al. (2021) report that high-proficiency male EFL learners demonstrate a significant positive relationship between international posture and WTC, while low-proficiency learners show no significant association. High-proficiency learners also report stronger international posture and higher WTC than low-proficiency learners.

### **3. Research Methods**

This section outlines the research design and details the procedures for data collection and analysis. It describes the participants, setting, and instrument, followed by the steps taken to generate and interpret the data. With a view to gaining insight into what motivates EFL university students to learn English and their WTC in English in Hungarian higher education, the aim of this study is 1) to develop and pilot a questionnaire with reliable constructs for this purpose, 2) to map EFL university students' motivational profile and their WTC in the Hungarian context, and 3) to investigate the relationship between EFL university students' motivation and their WTC in English. Based on the literature review and aligned with the aim of this study, the following research questions were formulated:

RQ 1: How reliable are the constructs of the questionnaire for measuring EFL university students' motivation to learn English and their willingness to communicate in English?

RQ 2: What characterizes EFL university students' motivational disposition towards learning English as a foreign language and their willingness to communicate in English inside and outside the classroom in the context of Hungarian tertiary education?

RQ 3: What correlations exist between EFL university students' motivational disposition towards learning English as a foreign language and their willingness to communicate inside and outside the classroom in the context of Hungarian tertiary education?

RQ 4: How does the motivational disposition of EFL university students towards learning English as a foreign language predict their willingness to communicate in English inside and outside the classroom in the context of Hungarian tertiary education?

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### 3.1. Quantitative Design

This study employed a quantitative research design to examine EFL university students' motivation to learn English and their WTC in English inside and outside the classroom in Hungarian higher education. A quantitative approach was selected because quantitative inquiry is systematic, rigorous, and focused, and it relies on precise measurement to produce reliable and replicable data that can be generalised to similar contexts. Questionnaire-based data collection was chosen as an appropriate method because questionnaires are relatively easy to construct, highly versatile, and capable of gathering a large amount of information within a short period of time in a format that is readily suitable for statistical analysis. In addition, questionnaire items allow the systematic elicitation of information about respondents across clearly defined criteria (Dörnyei, 2007). To address the aims of the study, a questionnaire was developed and piloted to ensure its reliability and validity for the Hungarian university context.

### 3.2. Participants and Setting

This study involved BA- and MA-level EFL university students studying at different universities in Hungary. Participants were recruited through purposive, convenience, and snowball sampling, following Dörnyei's (2007) recommendations to ensure diverse perspectives and rich data. The questionnaire was administered online through Google Forms, which made participation convenient. In total, 100 students responded during the fall semester of 2024 over a four-week period: 73 females, 20 males, 3 non-binary participants, and 4 who preferred not to say. The average age of the sample was 21, with ages ranging from 18 to 28 and a standard deviation of 2.02.

### 3.3. The Instrument

To develop a reliable and valid measurement tool, the questionnaire instrument was developed with reference to Dörnyei's (2007) 5-step validation model. In the first step, an item pool was created with a wide range of possible items for each scale. Some items were adapted from previously validated questionnaires, and others were developed by the author based on insights from the literature review and from the themes that emerged in 21 interviews that had preceded that pilot study. Motivational disposition constructs 1 to 6, namely Motivated Learning Behaviour (MLB), Ideal L2 Self (ILS), Ought to L2 Self (OLS), Parental Encouragement or Family Influence (FI), Instrumentality (INST), and Intrinsic Motivation (IM), were adapted from the empirical study by Taguchi et al. (2009). Constructs 7 and 8, Attitude towards the L2 Community (ATT) and Travel Orientation (TRAVEL), were adapted from Ryan (2009). Construct 9, International Posture (IP), was adapted from Yashima (2009). Construct 10, Motivation to Learn English in Online versus In Person Classes, was newly developed on the basis of the interview findings. Construct 11, Teacher's Role in Motivation, was adapted from Kálmán (2015). With regard to willingness to communicate, the items measuring Willingness to Communicate in English Inside the Classroom (WTCIN) were adapted from Peng (2013), Ryan (2009), and Yashima (2009). In contrast, the items measuring Willingness to Communicate in English Outside the Classroom (WTCOUT) were self-constructed on the basis of the themes that emerged from the 21 interviews conducted prior to the pilot study.

Subsequently, for expert judgement and for checking the understanding level, three researchers (the supervisor and two PhD candidates, one from the same faculty and another from a different

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faculty) were asked to provide feedback and reduce the number of items (Step 2). Some modifications were made based on expert judgement and colleagues' feedback. After receiving their feedback, the pilot questionnaire was prepared in the way described below (Step 3).

When the final set and order of items were established, the online form was created. The final questionnaire contained 87 closed-ended items, each rated on a six-point Likert scale. For the motivational constructs, the scale ranged from 1 (strongly disagree) to 6 (strongly agree), while for the WTC constructs it ranged from definitely willing to not willing. Dörnyei and Taguchi (2009) note that the Likert scale is a widely used instrument for measuring attitudes, typically employing five or six response options. Although five-point scales are common in research, this study adopted a six-point scale in order to avoid a neutral midpoint and to encourage more decisive responses. Previous research suggests that midpoint selection may reflect low cognitive effort (Krosnick, 1999; Krosnick et al., 2005).

The pilot instrument consisted of three parts. The first part included background questions related to the participants' age, gender, nationality, major, current academic level, year of study, university, age at which they began learning English, and English language proficiency. The second part measured factors related to the participants' motivational disposition, while the third part focused on students' WTC in English. Two open-ended questions followed the Likert-scale items in order to elicit further views on what participants considered motivating and what encouraged their WTC in English. The instrument covered eleven motivational disposition constructs (1 to 11) and two WTC criterion constructs (12 and 13), which were derived from the literature review and from themes identified in the preliminary interviews.

(1) *Motivated Learning Behaviour* (MLB) (six items): the degree of effort EFL university students are willing to devote to English study in order to reach a high level of proficiency.

Example: I am prepared to expend a lot of effort in learning English (Item 43).

(2) *Ideal L2 Self* (ILS) (six items): the extent to which learners envision themselves as confident and proficient English users in the future.

Example: I can imagine myself speaking English as if I were a native speaker of English (Item 44).

(3) *Ought-to L2 Self* (OLS) (six items): the degree to which learners feel motivated by external expectations and pressures that direct them toward successful English learning.

Example: Studying English is important to me because other people will respect me more if I have a knowledge of English (Item 56).

(4) *Parental Encouragement/ Family Influence* (FI) (six items): the extent to which family members provide support, expectations, and encouragement for English learning.

Example: My parents encourage me to study English (Item 2).

(5) *Instrumentality* (INST) (six items): the degree to which students view English as a practical means to achieve future goals related to work, study, or life abroad.

Example: Studying English is important to me because I would like to spend a longer period living abroad (e.g., studying and working) (Item 47).

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(6) *Intrinsic Motivation (IM)* (six items): the extent to which students feel enjoyment, interest, and personal satisfaction during the process of learning English.

Example: I really enjoy learning English (Item 37).

(7) *Attitudes towards Learning Community (ATT)* (seven items): the degree to which learners hold positive interest and openness toward English-speaking people, cultures, and communities. Example: I would like to know more about people from English-speaking countries (Item 38).

(8) *Travel Orientation (TRAVEL)* (six items): the extent to which learners value English as a useful resource for travel-related communication and experiences abroad.

Example: Learning English is important to me because I use it when I am on holiday abroad (Item 50).

(9) *International Posture (IP)* (seven items): the degree of openness learners show toward international interactions, global involvement, and intercultural engagement.

Example: I want to participate in a volunteer activity to help foreigners living in the surrounding community (Item 40).

(10) *Motivation to Learn English in Online vs. In-person Classes (ONLINE)* (seven items): the extent to which learners experience stronger or weaker motivation depending on the learning mode of online or in-person instruction.

Example: In-person classes make the learning experience feel more real and personal (Item 69).

(11) *Teacher's Role in Motivation (TRM)* (seven items): the degree to which the teacher's behaviour, attitude, and classroom environment influence learners' motivation to study English.

Example: My English language teacher motivates me if he or she holds the lessons in a positive and supportive learning environment (Item 53).

(12) *Willingness to Communicate in English Inside the Classroom (WTCIN)* (eight items): the extent to which learners choose to initiate or participate in English communication during classroom activities.

Example: I am willing to volunteer an answer when the teacher asks a question in class (Item 77).

(13) *Willingness to Communicate in English Outside the Classroom (WTCOUT)* (nine items): the extent to which learners choose to use English in real-life or informal situations beyond the classroom. Example: I am willing to use English when communicating with my international friends, both in person and through digital communication (Item 79).

### **3.4. Procedure and Data Analysis**

The questionnaire was developed in English. According to the self-reported English proficiency levels, fourteen students selected C2, sixty students selected C1, and the remaining twenty-six students selected B2 as their English proficiency level. These levels ensured that they understood the questionnaire without difficulty. Two lay people from Myanmar who were close to the target group completed the questionnaire to confirm that each item was understandable. In addition, another two members of the target population, who were learners of English, took

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part in a think-aloud protocol. They verbalised their thoughts as they completed the items to show how they interpreted each statement and to identify any problems that needed revision. Feedback from this stage led to the rewording of several problematic items before the final instrument was prepared.

The instrument was then piloted with EFL university students in the fall semester of 2024. Once the first 100 responses had been collected, the reliability analysis of the instrument began. All completed questionnaires were coded, and the results related to negatively worded items were reverse-coded. SPSS (Statistical Package for the Social Sciences) version 27.0 was used for data analysis. To examine the internal consistency of the scales, Cronbach's alpha coefficient and McDonald's omega coefficient were calculated. To investigate the general motivational disposition of EFL learners and their WTC, descriptive statistics were computed. Correlation analyses were conducted to examine relationships among the motivational scales and between the motivational scales and the criterion measure, the WTC scale. Regression analyses were carried out to identify which motivational constructs function as predictor variables of students' WTC inside and outside the classroom.

### **3.5. Validating the Questionnaire**

After the data had been computer coded, the next stage of the validation process began. This stage corresponded to Step 4 of Dörnyei's (2007) model, which involves examining three key features of the responses. The first feature concerns missing responses and any signs that the instructions were misunderstood. The second feature concerns the response range of each item, because items that almost everyone agrees with, or almost everyone disagrees with, cannot be used effectively in statistical analyses. Statistical procedures require a certain amount of variation in scores. The third feature concerns the internal consistency of multi-item scales (Dörnyei, 2007).

Regarding the first aspect, the dataset contained no missing responses. This showed that the participants understood the questionnaire clearly, so no changes were required based on this criterion. Regarding the second aspect, some items, such as Item 1 ("If an English course was offered at university or somewhere else in the future, I would like to take it."), received the same response from all participants. Because these items did not produce variation, they could not be processed statistically and had to be removed from the final questionnaire. Keeping them would have weakened the internal reliability of the scales, which would have negatively influenced the third validity criterion, the internal consistency of multi-item scales.

To examine the internal reliability of the thirteen multi-item scales, Cronbach's alpha coefficients and McDonald's omega coefficients were calculated both before and after the adjustments described above. All scales showed acceptable values for both reliability indices prior to any modification. However, Step 5 of Dörnyei's (2007) validation process required post-hoc item analysis. This step led to the removal of the weakest item from each scale. After this refinement, the internal consistency of the scales improved further, as reflected in higher Cronbach's alpha and omega coefficient values (see Table 1).

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## 4. Results and Discussion

This section of the paper presents the results and discussion of the findings. The section is organized in accordance with the four research questions.

### 4.1. The Reliability of the Constructs in the Questionnaire

To answer RQ1 (How reliable is the questionnaire for measuring EFL university students' motivation to learn English and their willingness to communicate in English?), the internal consistency of the scales was examined in order to establish the reliability of the instrument. Cronbach's alpha and McDonald's omega coefficients were calculated for each scale as indicators of scale-level reliability. In addition, item-rest correlations and Cronbach's alpha if item deleted values were inspected to evaluate the contribution of individual items to their respective scales. A threshold value of 0.70 was considered acceptable for Cronbach's alpha and McDonald's omega (Dörnyei & Csizér, 2002). The results showed that all scales met or exceeded this threshold. Item-level diagnostics did not indicate any problematic items, as the removal of individual items did not result in a substantial improvement in reliability. Overall, the internal consistency of the scales was acceptable, and the questionnaire demonstrated satisfactory reliability across all constructs, as shown in Table 1.

TABLE 1. RELIABILITY COEFFICIENTS OF THE SCALES

No.	Construct	Number of Items	Cronbach's Alpha (if item dropped)	McDonald's Omega (if item dropped)
1.	Motivated Learning Behaviour	6	.720	.746
2.	Ideal L2 Self	6	.818	.828
3.	Ought-to L2 Self	6	.782	.805
4.	Family Influence	6	.839	.843
5.	Instrumentality	6	.786	.798
6.	Intrinsic Motivation	6	.786	.804
7.	Attitudes towards Learning Community	7	.874	.879
8.	Travel Orientation	6	.729	.746
9.	International Posture	7	.779	.788
10.	Motivation to Learn English in Online Classes	7	.869	.887
11.	Teacher's Role in Motivation	7	.873	.876

12.	Willingness to Communicate in English Inside the Classroom	8	.932	.937
13.	Willingness to Communicate in English Outside the Classroom	9	.957	.959

Source: own compilation/ calculations

It is important to clarify that the exploratory factor analysis (EFA) was conducted to assess whether the pilot data were suitable for factor analysis and to determine whether item reduction was warranted before proceeding to the larger-scale data collection. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was 0.533, indicating marginal adequacy and limited shared variance among variables; thus, inter-item correlations were only just sufficient for reliable factor extraction. Consistent with this, Bartlett’s Test of Sphericity was significant,  $\chi^2(3741) = 8945.065$ ,  $p < .001$ , confirming that the correlation matrix departed from an identity matrix and that factor analysis was statistically permissible (see Table 2).

TABLE 2. KMO AND BARTLETT’S TEST

KMO and Bartlett’s Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.533
Bartlett’s Test of Sphericity	Approx. Chi-Square	8945.065
	Df	3741
	Sig.	.000

Source: own compilation/ calculations

Given the relatively small pilot sample ( $n = 100$ ) in relation to the large number of items, sampling adequacy was constrained. As a result, any extracted factor solution would likely be unstable and sensitive to minor fluctuations in the data, which reduces the likelihood of replicability. Although these statistical prerequisites were met, the resulting factor structure was not sufficiently robust to justify item reduction at this stage. In light of the modest sample size and the unfavourable item-to-participant ratio, the methodological constraints outweighed any potential benefits of pruning the instrument on the basis of the pilot EFA.

Consequently, the EFA was treated as a preliminary diagnostic procedure rather than a basis for structural revision. The questionnaire nevertheless demonstrated satisfactory internal consistency across all scales. Therefore, the existing item set was retained, and the study intends to proceed to the main phase with a substantially larger and more diverse university sample, where a more stable and replicable factor structure could be expected. Overall, the current instrument shows promise as a tool for investigating motivation and willingness to communicate in Hungarian higher education and in comparable foreign language contexts, although further validation with larger samples remains essential for establishing stronger psychometric evidence.

#### 4.2. Descriptive Statistics

To answer RQ2 (What characterizes EFL university students’ motivational disposition towards learning English as a foreign language and their willingness to communicate in English inside and outside the classroom in the context of Hungarian tertiary education?) and to determine the relative importance of the constructs, descriptive statistics, mean values, and standard

deviations of the scales were calculated (see Table 3). The results showed that the mean values of all scales were close to the higher end of the Likert scale. Ideal L2 Self, Attitudes towards learning community, and Travel orientation produced the highest mean values at 5.31, 5.14, and 5.13. Motivation to learn English in online classes, Ought-to L2 self, and Family influence produced the lowest mean values at 2.52, 3.18, and 3.65 respectively. The prominence of the Ideal L2 Self corresponds closely with previous L2MSS research, which consistently identifies this construct as the strongest motivational component associated with willingness to communicate across contexts (Khajavy & Ghonsooly, 2017; Öz & Bursalı, 2018; Sadoughi & Hejazi, 2023; Wei & Xu, 2022; Zhou, 2022).

TABLE 3. DESCRIPTIVE STATISTICS OF THE SCALES

No.	Construct	Means	Standard Deviation
1.	Motivated Learning Behaviour	4.34	0.82
2.	Ideal L2 Self	5.31	0.76
3.	Ought-to L2 Self	3.18	1.00
4.	Family Influence	3.65	1.13
5.	Instrumentality	4.76	0.97
6.	Intrinsic Motivation	4.61	0.84
7.	Attitudes towards Learning Community	5.14	0.86
8.	Travel Orientation	5.13	0.73
9.	International Posture	4.34	0.94
10.	Motivation to Learn English in Online Classes	2.52	1.08
11.	Teacher's Role in Motivation	4.94	0.85
12.	Willingness to Communicate in English Inside the Classroom	4.85	1.09
13.	Willingness to Communicate in English Outside the Classroom	5.48	0.93

Source: own compilation/ calculations

The descriptive statistics show that students reported generally high levels of motivation across most constructs. *Ideal L2 Self* had a mean of 5.31 (SD = 0.76), indicating that students held strong visions of themselves as competent future English users. *Attitudes towards the Learning Community* (M = 5.14, SD = 0.86) and *Travel Orientation* (M = 5.13, SD = 0.73) also showed high values, suggesting positive feelings toward English-speaking communities as well as strong interest in travel and intercultural experience. This pattern aligns with earlier findings

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showing that learners with a strong Ideal L2 Self and high International Posture demonstrate greater willingness to communicate (Li & Liu, 2021; Yashima et al., 2004).

The teacher's role in motivation also showed a relatively high mean of 4.94 (SD = 0.85), indicating that students viewed the teacher as an important motivational factor. This finding aligns with studies by Kaw (2025), Kaw and Kálmán (2025), Kálmán (2021, 2023), and Lamb (2017). Intrinsic motivation (M = 4.61, SD = 0.84) and instrumentality (M = 4.76, SD = 0.97) further indicate that students found personal enjoyment in English learning and recognised its practical value for future goals. *Motivated Learning Behaviour* and *International Posture* both had means of 4.34, with SDs of 0.82 and 0.94 respectively, falling within the moderately high range. These values suggest that students maintained a stable willingness to invest effort and an openness toward global engagement.

Lower values appeared for constructs linked to external pressure or weaker personal preference. *Ought-to L2 Self* had a mean of 3.18 (SD = 1.00), reflecting a relatively weak role of external obligations in shaping learners' motivation. This is consistent with previous studies reporting that externally imposed motives are less stable and show weaker associations with willingness to communicate (Khajavy & Ghonsooly, 2017; Peng, 2014; Sadoughi & Hejazi, 2023; Taguchi et al., 2009; Wei & Xu, 2022; Zhou, 2022). *Family Influence* showed a mean of 3.65 (SD = 1.13), again suggesting that external expectations played a smaller role in students' motivation. *Motivation to Learn English in Online Classes* had the lowest mean among all constructs (M = 2.52, SD = 1.08), indicating clear dissatisfaction with or low engagement in online English learning, consistent with Kaw's (2025) findings.

Willingness to communicate also showed strong results. *WTC inside the Classroom* had a mean of 4.85 (SD = 1.09), while *WTC outside the classroom* showed an even higher mean of 5.48 (SD = 0.93). These values indicate that students felt highly confident and motivated to use English in both contexts, with noticeably greater readiness to communicate outside the classroom. The overall WTC score had a mean of 5.18 with a standard deviation of 0.88, reflecting a strong general readiness among students to communicate in English.

### 4.3. Correlation Analyses

To answer RQ3 (What correlations exist between EFL university students' motivational disposition towards learning English as a foreign language and their willingness to communicate inside and outside the classroom in the context of Hungarian tertiary education?), correlation analyses were used to examine the correlations among the motivational scales and between the motivational scales and the criterion measure, the WTC scale.

In terms of correlations among the motivational scales, the analysis revealed several meaningful associations (see Table 4). The strongest correlation was observed between intrinsic motivation and motivated learning behaviour ( $r = .753, p < .001$ ). This very strong positive relationship indicates that students who experience enjoyment, interest, and personal satisfaction in learning English tend to demonstrate higher levels of effort, persistence, and active engagement in their studies. This finding supports the central role of intrinsic motivation in sustaining motivated learning behaviour.

Another strong correlation appeared between attitudes towards the learning community and travel orientation ( $r = .726, p < .001$ ). This association suggests that learners who hold positive

views of the English-speaking community also tend to express a stronger desire to travel and engage across cultural contexts. The third strongest correlation was found between international posture and instrumentality ( $r = .719, p < .001$ ). This strong relationship indicates that learners who adopt an outward-looking, internationally oriented stance towards English also perceive the language as highly valuable for practical purposes such as career development and global communication. Students who value the practical benefits of English also show a clear willingness to engage with global contexts. These associations reflect previous findings that position international posture and future-oriented goals as closely interconnected motivational dimensions within the L2MSS framework (Yashima, 2002; Yashima et al., 2004).

TABLE 4. SIGNIFICANT CORRELATIONS ( $P < .001$ ) AMONG THE MOTIVATIONAL SCALES

		1	2	3	4	5	6	7	8	9	10	11	12	13
1.	Motivated learning behaviour	1												
2.	Ideal L2 self	.525	-											
3.	Ought-to L2 self	.342	.291	-										
4.	Family influence	.454	.290	.601	-									
5.	Instrumentality	.388	.617	.404	.410	-								
6.	Intrinsic Motivation	.753*	.559	.201	.421	.510	-							
7.	Attitudes towards learning community	.487	.700	.294	.414	.520	.604	-						
8.	Travel orientation	.458	.671	.394	.419	.651	.512	.726*	-					
9.	International posture	.416	.556	.334	.382	.719*	.593	.685	.626	-				
10.	Motivation to learn English in online classes	.078	-.194	.265	.152	.027	-.051	.032	.092	.072	-			
11.	Teacher's role in motivation	.615	.657	.365	.404	.376	.559	.565	.556	.417	-.121	1		

12	WTCIN	.315	.469	.067	.280	.170	.359	.333	.366	.310	-.167	.404	1	
13	WTCOUT	.396	.689	.107	.201	.434	.371	.581	.518	.324	-.191	.507	.538	1

Source: own compilation/ calculations

With regards to the correlation between the motivational constructs and willingness to communicate inside the classroom (WTCIN), the strongest correlation is observed for the Ideal L2 Self ( $r = .469, p < .001$ ). This moderate positive relationship indicates that students who possess a well-developed future self-image as English users are more willing to speak English during classroom activities. A strong sense of future identity therefore appears to support classroom communication. Another moderate correlation is found between WTCIN and the teacher's role in motivation ( $r = .404, p < .001$ ). This result suggests that students who perceive their teachers as supportive, motivating, and encouraging show higher levels of willingness to communicate in class. Teacher-related factors therefore play a key role in shaping classroom interaction. A slightly weaker, but still moderate, correlation occurs between WTCIN and travel orientation ( $r = .366, p < .001$ ). This association indicates that learners who express a desire to travel and use English abroad are more willing to communicate in classroom settings, possibly because classroom interaction is perceived as preparation for future real-world use. These results (see Table 4) align with multiple studies which identify the Ideal L2 Self as a consistent correlate of classroom willingness to communicate (Khajavy & Ghonsooly, 2017; Öz & Bursalı, 2018; Sadoughi & Hejazi, 2023; Wei & Xu, 2022; Zhou, 2022).

TABLE 5. SIGNIFICANT CORRELATIONS ( $p < .001$ ) BETWEEN THE MOTIVATIONAL SCALES AND THE CRITERION MEASURE SCALE (WTCIN)

		WTCIN
1.	Ideal L2 self	.469
2.	Teacher's role in motivation	.404
3.	Travel orientation	.366

Source: own compilation/ calculations

Regarding the correlation between the motivational constructs and willingness to communicate outside the classroom (WTCOUT), the strongest correlation is observed for the Ideal L2 Self ( $r = .689, p < .001$ ). This strong positive relationship highlights the central role of learners' future self-guides in encouraging the use of English beyond formal instructional contexts. The second strongest correlation is found between WTCOUT and attitudes towards the learning community ( $r = .581, p < .001$ ). This finding suggests that learners who hold positive views of the English-speaking community are more inclined to communicate in English in real-life situations, where interaction is less constrained by classroom structure. The third strongest correlation is observed between WTCOUT and travel orientation ( $r = .518, p < .001$ ). This relationship indicates that aspirations for travel and international mobility are strongly associated with learners' readiness to communicate in English outside the classroom. Learners

with higher travel orientation may view real-world English use as an extension of their personal mobility goals (see Table 5).

TABLE 6. SIGNIFICANT CORRELATIONS ( $p < .001$ ) BETWEEN THE MOTIVATIONAL SCALES AND THE CRITERION MEASURE SCALE (WTCOUT)

		WTCOUT
1.	Ideal L2 self	.689
2.	Attitudes towards learning community	.581
3.	Travel orientation	.518

Source: own compilation/ calculations

#### 4.4. Regression Analyses

In order to answer RQ4 (How does the motivational disposition of EFL university students towards learning English as a foreign language predict their willingness to communicate in English inside and outside the classroom in the context of Hungarian tertiary education?), that is, to identify which motivational constructs act as predictor scales of students' WTC inside and outside the classroom, linear regression analyses with an enter approach were carried out for the criterion variables of WTCIN and WTCOUT.

##### 4.4.1. Motivational Predictors of Willingness to Communicate Inside the Classroom (WTCIN)

With willingness to communicate inside the classroom (WTCIN) as the criterion variable, the overall regression model was statistically significant,  $F(11, 99) = 4.916$ ,  $p < .001$ , and it explained a meaningful proportion of variance in WTCIN, with an adjusted  $R^2$  value of .303. This result shows that the set of motivational variables provides a substantive prediction of students' WTC in English during classroom activities.

The three strongest positive predictors of WTCIN are Ideal L2 Self ( $\beta = .542$ ), Family Influence ( $\beta = .322$ ), and International Posture ( $\beta = .314$ ). Ideal L2 Self emerged as the most influential positive predictor, which indicates that students with a well-developed future self-image as successful users of English are more willing to communicate in English inside the classroom. Family Influence represents the second strongest positive predictor, which suggests that family encouragement and support are associated with higher readiness to use English in instructional settings. International Posture appears as the third strongest positive predictor, which shows that openness towards international communication and global interaction relates to increased classroom communication once the effects of the other motivational variables are controlled.

In contrast, the two strongest negative predictors of WTCIN are Instrumentality ( $\beta = -.480$ ) and Attitudes towards the Learning Community ( $\beta = -.331$ ). Higher instrumentality, as it operates in this model, relates to lower willingness to communicate inside the classroom once the other motivational constructs are held constant. This implies that stronger goal-driven, outcome-focused reasons for learning English correspond to reduced in-class communication in the presence of the other predictors. Attitudes towards the learning community also show a negative unique association with WTCIN, which suggests that shared variance with other motivational constructs results in a negative contribution within the regression model.

Overall, these findings indicate that willingness to communicate inside the classroom is most strongly supported by a salient Ideal L2 Self, family support, and international orientation, whereas instrumentality and attitudes towards the learning community show negative unique associations with WTCIN once the influence of the other motivational variables is taken into account. The results are summarised in Table 7.

TABLE 7. RESULTS OF REGRESSION ANALYSIS OF THE MOTIVATIONAL SCALES WITH WTC INSIDE THE CLASSROOM AS THE CRITERION VARIABLE (SIGNIFICANCE LEVEL  $p < .01$ ),  $R^2 = .303$

Variable	$\beta$	t	p
Ideal L2 Self	.542	3.415	<.001
Family Influence	.322	2.733	.008
International Posture	.314	2.127	.036
Instrumentality	-.480	-3.256	.002
Attitudes towards the Learning Community	-.331	-2.091	.039

Source: own compilation/ calculations

#### 4.4.2. Motivational Predictors of Willingness to Communicate Outside the Classroom (WTCOUT)

With willingness to communicate outside the classroom (WTCOUT) as the criterion variable, the overall regression model was statistically significant,  $F(11, 99) = 10.549$ ,  $p < .001$ , and it explained a substantial proportion of variance in WTCOUT, with an adjusted  $R^2$  value of .515. This result shows that the set of motivational variables provides a strong explanation of students' willingness to use English beyond the classroom context.

The three strongest positive predictors of WTCOUT are Ideal L2 Self ( $\beta = .402$ ), Attitudes towards the Learning Community ( $\beta = .379$ ), and Instrumentality ( $\beta = .238$ ). Ideal L2 Self emerges as the most influential positive predictor, which indicates that students with a clearly developed future self-image as proficient users of English report higher WTC in real-life contexts outside the classroom. Attitudes towards the learning community represent the second strongest positive predictor, which suggests that favourable views of the English-speaking community relate to greater WTC in English beyond formal instructional settings. Instrumentality appears as the third strongest positive predictor, which shows that students who associate English with concrete academic or professional goals are more willing to use English in everyday and informal situations.

In contrast, the two strongest negative predictors of WTCOUT are International Posture ( $\beta = -.283$ ) and Intrinsic Motivation ( $\beta = -.213$ ). International Posture shows the strongest negative unique effect in the model, which indicates that, after controlling for the other motivational variables, a stronger international orientation relates to lower WTC outside the classroom. This result contrasts with studies that report a positive relationship between international posture and WTC (Csizér & Kormos, 2009; Kaw, 2024; Kaw & Kálmán, 2025; Li & Liu, 2021; Mahmoodi

et al., 2021; Peng, 2015; Yashima, 2002; Yashima et al., 2004), but corresponds with the findings reported by Mystkowska-Wiertelak and Pietrzykowska (2011).

Intrinsic Motivation also shows a negative unique association with WTCOUT, which suggests that enjoyment-based motivation does not lead to increased out-of-class communication once future-oriented and socially related motivational factors are taken into account. These negative associations most likely reflect shared variance among predictors, which influences the direction of their unique contributions within the regression model. The results are summarised in Table 8.

TABLE 8. RESULTS OF REGRESSION ANALYSIS OF THE MOTIVATIONAL SCALES WITH WTC OUTSIDE THE CLASSROOM AS THE CRITERION VARIABLE (SIGNIFICANCE LEVEL  $p < .01$ ),  $R^2 = .515$

Variable	$\beta$	t	p
Ideal L2 Self	.402	3.036	.003
Attitudes towards the Learning Community	.379	2.870	.005
Instrumentality	.238	1.938	.056
International Posture	-.283	-2.303	.024
Intrinsic Motivation	-.213	-1.637	.105

Source: own compilation/ calculations

#### 4.4.3. Contextual Differences in Motivational Predictors of Willingness to Communicate Inside and Outside the Classroom

The two regression models differ notably, with the model predicting WTC outside the classroom explaining a substantially larger proportion of variance than the model predicting WTC inside the classroom. The model for WTCIN accounts for 30.3 per cent of the variance ( $R^2 = .303$ ), whereas the model for WTCOUT explains a substantially larger proportion of variance, at 51.5 per cent ( $R^2 = .515$ ). This difference indicates that motivational dispositions play a stronger role in explaining WTC outside the classroom than inside the classroom. Communication beyond instructional settings therefore appears to be more closely tied to students' motivational orientations.

Ideal L2 Self emerges as a strong positive predictor in both models, although its influence is stronger for WTCIN ( $\beta = .542$ ,  $p < .001$ ) than for WTCOUT ( $\beta = .402$ ,  $p = .003$ ). This pattern suggests that future self-guides are central to willingness to communicate in both contexts, but they are particularly influential in classroom settings, where learners may rely more heavily on imagined future identities to overcome situational constraints.

Attitudes towards the Learning Community show contrasting effects across the two contexts. In the WTCIN model, attitudes towards the learning community display a negative unique association ( $\beta = -.331$ ,  $p = .039$ ), whereas in the WTCOUT model they function as a strong positive predictor ( $\beta = .379$ ,  $p = .005$ ). This contrast suggests that positive attitudes towards the English-speaking community strongly support communication outside the classroom, where

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interaction aligns more directly with social and cultural engagement. Inside the classroom, however, the shared variance between attitudes and other motivational constructs results in a negative unique contribution once those overlapping influences are controlled.

International Posture also shows opposite effects across the two models. It positively predicts WTCIN ( $\beta = .314, p = .036$ ), but it negatively predicts WTCOUT ( $\beta = -.283, p = .024$ ). This finding indicates that an international orientation supports classroom communication, possibly because the classroom is perceived as a preparatory space for future international engagement. Outside the classroom, however, international posture shows a negative unique association once other motivational variables are controlled, which suggests overlap with stronger predictors such as Ideal L2 Self and attitudes towards the learning community.

Instrumentality demonstrates a further context-dependent pattern. In the WTCIN model, instrumentality shows a strong negative effect ( $\beta = -.480, p = .002$ ), whereas in the WTCOUT model it shows a positive but statistically non-significant effect ( $\beta = .238, p = .056$ ). This contrast suggests that outcome-focused motives may suppress classroom communication when other motivational orientations are taken into account, but they are more aligned with WTC outside the classroom, where English use directly serves practical and goal-related purposes.

The comparison shows that the same motivational constructs operate differently across classroom and out-of-class contexts. Classroom communication appears to be shaped more strongly by internal self-guides and social support, whereas communication outside the classroom aligns more closely with attitudes towards the English-speaking community and practical engagement with the language. The stronger explanatory power of the WTCOUT model further indicates that motivational factors are more directly connected to language use beyond formal instructional settings than within them.

The results show that Ideal L2 self explains 22 percent of the variance in students' WTC in English inside the classroom and 47.4 percent of the variance in their WTC outside the classroom. The effect of Ideal L2 self is therefore much stronger in out-of-class contexts ( $\beta = .689$ ) than in classroom settings ( $\beta = .469$ ). The high  $R^2$  value for WTC outside the classroom indicates that students' vision of themselves as successful English users is a powerful factor that encourages them to use English in real world situations. The  $R^2$  value for WTC inside the classroom also shows a meaningful level of explained variance, suggesting that students' image of their desired future English self influences their communication behaviour during lessons.

Overall, Ideal L2 self is a strong and significant predictor of WTC, with a moderate effect inside the classroom and a very strong effect outside the classroom. Students who hold a clear image of themselves as confident and proficient English users tend to communicate more in English, especially in authentic out-of-class contexts. This result aligns with previous studies (Khajavy & Ghonsooly, 2017; Öz & Bursalı, 2018; Sadoughi & Hejazi, 2023; Wei & Xu, 2022; Zhou, 2022).

## 5. Conclusion, Implications and Future Research Directions

This study had three aims, and the results seem to show that all three aims were fulfilled. The first aim was to develop and pilot a questionnaire with reliable constructs to map EFL university students' motivational profiles and their willingness to communicate in the Hungarian higher education context. This aim was reached through a careful review of the literature and through

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the selection of relevant motivational and WTC dimensions. The pilot results suggest that the instrument shows acceptable internal consistency across all scales. To confirm the reliability and validity of the instrument more securely, future studies could include larger and more diverse groups of university students and examine the stability of each scale further.

The second aim was to describe the students' motivational dispositions and their willingness to communicate. The questionnaire included eleven constructs that helped outline the students' motivational profile. Ideal L2 Self, attitudes towards the learning community, and travel orientation appeared to be the strongest motivational dimensions, while motivation to learn English in online classes received the lowest scores. The WTC results suggest that students felt more ready to communicate in English outside the classroom than inside it.

The third aim was to examine the relationship between the motivational dimensions and students' willingness to communicate in English. Correlation and regression analyses suggest that Ideal L2 self plays a central role in students' communicative behaviour. Ideal L2 Self appeared as the only significant predictor of WTC both inside and outside the classroom, with a much stronger effect outside the classroom. These results might indicate that students who form clear images of themselves as future English users show greater readiness to use the language, especially in real-world settings.

The results seem to have useful pedagogical and institutional implications for EFL education in Hungarian higher education. The role of Ideal L2 Self in predicting WTC inside and especially outside the classroom seems to suggest that teachers and curriculum designers may benefit from placing more attention on learners' future self-images. Classroom practice may include guided vision building tasks, narrative activities, goal setting, and reflection on future language use in academic, professional, and personal contexts. These activities could help students form clearer ideas about themselves as future English users and might support their willingness to communicate.

The high means for attitudes towards the learning community and travel orientation suggest that students value a supportive classroom climate and often relate English to mobility and intercultural contact. Institutions and teachers could respond by creating classroom environments that encourage cooperation, peer support, and respectful interaction. Universities might also include more intercultural or international elements in the curriculum through virtual exchanges, guest speakers, short mobility programmes, or project work that brings students into contact with English speaking communities. These opportunities could help students feel that English offers access to wider communities.

The low scores for motivation to learn English in online classes seem to show continued dissatisfaction with online learning in this context. Programme leaders and instructional designers may need to reconsider the design of online components. More interactive tasks, clearer communication channels, and activities with meaningful communicative purposes could make online learning more engaging. A blended approach that uses the strengths of both face to face and online environments might support motivation more effectively.

The modest role of external pressure, such as ought-to L2 self and family influence, suggests that interventions may work better when they focus on internal goals rather than obligation. This could influence counselling, feedback, and assessment practices by encouraging more attention to personal growth, self-efficacy, and autonomy.

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Finally, the instrument developed and piloted in this study seems to show solid internal consistency. It may serve as a useful tool for researchers and practitioners who want to examine motivational profiles and WTC in Hungarian higher education or in similar contexts. The questionnaire may support needs analysis, programme evaluation, and studies that observe changes in motivation and WTC over time. In addition, the study could offer a modest contribution by providing empirical evidence from the Hungarian context, which remains underrepresented in the WTC literature. Its novelty may also lie in comparing students' willingness to communicate inside and outside the classroom within this specific regional setting, a dimension that has received limited attention in previous research.

This study has several limitations that should be acknowledged. The pilot sample was relatively small compared to the number of questionnaire items, which reduces the statistical power of the analyses and limits the stability of the factor structure. Consequently, the findings should be interpreted cautiously until they can be validated with more robust, larger-scale samples. The study was also conducted within the specific context of Hungarian higher education, which is characterised by structural constraints such as large and heterogeneous student groups, uneven institutional support for language programmes, and limited opportunities for authentic English use on campus. These contextual factors may have influenced students' motivational patterns and willingness to communicate; therefore, the results may not fully generalise to other Hungarian institutions or different educational settings. Finally, the geographic scope of the literature reviewed presents a limitation. To better ground the study locally, the literature review should incorporate more studies specifically conducted within the Hungarian or Central and Eastern European context.

In terms of researcher reflexivity and positionality, the author acknowledges that the development of the original questionnaire items was shaped by personal interpretations of the preliminary interview data. Although efforts were made to stay close to participants' voices, the process necessarily involved subjective decisions about coding, item phrasing, and thematic categorisation. To minimise interpretive bias, the initial coding scheme and item pool were reviewed and refined collaboratively with the thesis supervisor, whose feedback helped provide critical distance and theoretical grounding. Expert judgement was also sought; the supervisor and additional academic peers reviewed early drafts of the items and recommended revisions to enhance conceptual clarity and cultural appropriateness. Two fellow PhD researchers independently co-coded portions of the interview data and compared interpretations, helping to identify ambiguities and increase the reliability of the thematic analysis. Despite these steps, the author recognises that the final set of items still reflects some degree of interpretive influence. Future research involving multiple coders, cross-institutional collaboration, or participatory item development could further strengthen the neutrality and validity of the instrument.

This study aimed to provide a clearer understanding of Hungarian EFL university students' motivation and WTC, and to offer insight into how these dimensions relate to one another. Although the findings seem informative, more research with larger samples would be needed to confirm the structure and predictive power of the questionnaire. Future work could include students from other institutions, follow up qualitative studies, and comparisons between different academic programmes or learner groups. Studies in other cultural and educational

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contexts could also help identify differences in motivational patterns, which may support the development of teaching practices that respond more effectively to students' needs.

Future research could focus on several areas. First, a larger and more diverse sample of university students could help confirm the reliability and validity of the questionnaire. Data from different programmes, year groups, and institutions could show whether the constructs behave in a similar way across contexts. Second, future studies might examine changes in motivation and WTC over time. A longitudinal design could show how Ideal L2 Self, attitudes towards the learning community, and other constructs develop during students' university years, and whether these changes influence their communication behaviour. Third, qualitative follow up research could provide deeper insight into why certain constructs, such as Ideal L2 self or attitudes towards the learning community, show strong effects on WTC. Interviews or focus groups could help explain how students form future self-images and how classroom experiences shape their willingness to communicate.

Fourth, studies could explore differences across academic fields. English majors and non-English majors may hold different motivational beliefs and may show different levels of WTC. Comparing these groups could help identify programme specific needs. Fifth, research could examine the influence of teacher behaviour in more detail. Although teacher's role in motivation showed moderate correlations, classroom observations and teacher interviews could help clarify which behaviours support WTC most effectively. Sixth, the low scores related to online English learning suggest that further investigation could be useful. Future research might explore the specific features of online environments that reduce motivation and WTC, as well as possible solutions.

Finally, similar studies could be carried out in other national or cultural contexts. Comparisons across countries might show whether Hungarian students' motivational patterns and WTC tendencies align with or differ from those found elsewhere. Such research could support the development of teaching approaches that respond more accurately to students' needs in different educational settings.

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## Appendix

### The Pilot Questionnaire Constructs: EFL University Students' Motivation to Learn English and Their Willingness to Communicate (WTC) in English

#### 1. Motivated Learning Behaviour (MLB) (Taguchi et al., 2009), 6 items

MLB1. If my teacher gave the class an optional assignment, I would certainly volunteer to do it.

MLB2. I would like to study English even if I were not required to do so.

MLB3. I would like to concentrate on studying English more than any other topic.

MLB4. I am prepared to expend a lot of effort in learning English.

MLB5. I am working hard at learning English.

MLB6. Compared to my classmates, I think I study English relatively hard.

#### 2. Ideal L2 Self (ILS) (Taguchi et al., 2009), 6 items

ILS1. Whenever I think of my future career, I imagine myself using English.

ILS2. I can imagine myself speaking English with international friends or colleagues.

ILS3. I can imagine myself living abroad and using English effectively for communicating with the locals.

ILS4. I can imagine myself speaking English as if I were a native speaker of English.

ILS5. I can imagine myself writing English e-mails/letters fluently.

ILS6. The things I want to do in the future require me to use English.

#### 3. Ought to L2 Self (OLS) (Taguchi et al., 2009), 6 items

OLS1. I study English because close friends of mine think it is important.

OLS2. Learning English is necessary because people surrounding me expect me to do so.

OLS3. I consider learning English important because the people I respect think that I should do it.

OLS4. Studying English is important to me in order to gain the approval of my peers/teachers/family/boss.

OLS5. Studying English is important to me because an educated person is supposed to be able to speak English.

OLS6. Studying English is important to me because other people will respect me more if I have a knowledge of English.

#### 4. Parental Encouragement/ Family Influence (FI) (Taguchi et al., 2009), 6 items

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FI1. My parents encourage me to study English.

FI2. My parents encourage me to take every opportunity to use my English (e.g., speaking and reading).

FI3. My parents encourage me to practise my English as much as possible.

FI4. My parents encourage me to attend extra English classes after class (e.g., at English conversation schools or private teachers).

FI5. My parents/family believe(s) that I must study English to be an educated person.

FI6. Studying English is important to me in order to bring honour to my family.

### **5. Instrumentality (INST) (Taguchi et al., 2009), 6 items**

INST1. Studying English is important to me because English proficiency is necessary for promotion in the future.

INST2. Studying English is important to me because with English I can work globally.

INST3. Studying English can be important to me because I think it will someday be useful in getting a good job and/or making money.

INST4. Studying English can be important to me because I think I'll need it for further studies.

INST5. Studying English is important to me because I would like to spend a longer period living abroad (e.g., studying and working).

INST6. Studying English is important to me because I am planning to study abroad.

### **6. Intrinsic Motivation (IM) (Taguchi et al., 2009), 6 items**

IM1. I like the atmosphere of my English classes.

IM2. I always look forward to English classes.

IM3. I find learning English really interesting.

IM4. I really enjoy learning English.

IM5. I think time passes faster while studying English.

IM6. I would like to have more English lessons at school.

### **7. Attitudes Towards Learning Community (ATT) (Ryan, 2009), 7 items**

ATT1. I like to travel to English-speaking countries.

ATT2. I like meeting people from English-speaking countries.

ATT3. I like the people who live in English-speaking countries.

ATT4. I would like to know more about people from English-speaking countries.

ATT5. I like films and the music of English-speaking countries.

ATT6. I like English magazines, newspapers, or books.

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ATT7. I like TV programmes made in English-speaking countries.

**8. Travel Orientation (TRAVEL) (Ryan, 2009), 6 items**

TRAVEL1. I like to travel to countries where I can use my English.

TRAVEL2. Studying English will be useful when I travel overseas.

TRAVEL3. Learning English is important to me because I would like to visit countries where I can use my English.

TRAVEL4. Learning English is important to me because I would like to travel internationally.

TRAVEL5. Learning English is important to me because I use it when I am on holiday abroad.

TRAVEL6. Learning English is important to me because when planning a trip, the availability of English-speaking services influences my choice of accommodation and activities.

**9. International Posture (IP) (Yashima, 2009), 7 items**

IP1. I want to make friends with international students or employees in Hungary.

IP2. I try to talk with foreigners if I can.

IP3. I wouldn't mind sharing an apartment or room with an international student.

IP4. I want to participate in a volunteer activity to help foreigners living in the surrounding community.

IP5. I want to work in a foreign country.

IP6. I'd rather choose the kind of work that sends me overseas frequently.

IP7. I often read and watch news about foreign countries.

**10. Motivation to Learn English in Online vs. In-Person Classes (ONLINE) (Self-constructed based on interview findings), 7 items**

ONLINE1. I feel more motivated to learn English when I am in online classes.

ONLINE2. I find it hard to stay focused on English lessons when I am in online classes.

ONLINE3. Online English classes are more engaging and versatile.

ONLINE4. I like online English classes more than in-person classes.

ONLINE5. Online classes are more fun and effective than in-person classes.

ONLINE6. The convenience of accessing online English classes from any location positively influences my commitment to learning.

ONLINE7. In-person classes make the learning experience feel more real and personal.

**11. Teacher's Role in Motivation (TRM) (Kálmán 2015), 7 items**

TRM1. My English language teacher motivates me if he or she is empathetic.

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TRM2. My English language teacher motivates me if he or she takes my personality into account.

TRM3. My English language teacher motivates me if he or she speaks about his or her personal stories and experiences.

TRM4. My English language teacher motivates me if he or she knows my strengths and weaknesses.

TRM5. My English language teacher motivates me if he or she holds the lessons in a positive and supportive learning environment.

TRM6. My English language teacher motivates me if he or she trains himself or herself regularly.

TRM7. My English language teacher motivates me if he or she tailors the tasks to learner's needs.

**12. Willingness to Communicate Inside the Classroom (WTCIN) (Peng, 2013; Ryan, 2009; Yashima, 2009), 8 items**

WTCIN1. I am willing to talk freely in an English class when I am given a chance.

WTCIN2. I am willing to talk in front of the class in an English class if I am given a chance.

WTCIN3. I am willing to have a group discussion in an English class.

WTCIN4. I am willing to make a presentation in front of the whole class when I have a chance.

WTCIN5. I am willing to join a discussion in my English class.

WTCIN6. I am willing to volunteer an answer when the teacher asks a question in class.

WTCIN7. I am willing to ask questions if I don't understand something in class.

WTCIN8. I am willing to express my own opinions in class.

**13. Willingness to Communicate Outside the Classroom (WTCOUT) (Self-constructed based on interview findings), 9 items**

WTCOUT1. I am willing to use English when communicating with my international friends, both in person and through digital communication.

WTCOUT2. I am willing to switch to English when meeting people who do not speak my native language, to facilitate better communication.

WTCOUT3. I am willing to use English for online communication, including writing comments, making posts on social media platforms, and participating in text-based interactions.

WTCOUT4. I am willing to engage in conversations with people encountered abroad in foreign countries in English.

WTCOUT5. I am willing to use English during social activities and conversations with others, especially when interacting with international people.

WTCOUT6. I am willing to interact with online friends in English.

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WTCOUT7. I am willing to respond in English when someone addresses me in situations where English may be more comfortable for effective communication.

WTCOUT8. I am willing to use English at university, especially when interacting with foreign students.

WTCOUT9. I am willing to use English when socialising with international friends outside the classroom.

## **Declaration Statements**

### **Conflict of Interest**

The author reports no conflict of interest.

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### **Data Availability**

No dataset is associated with this article. *OR* Data supporting the conclusions of this study can be made available upon reasonable request from the corresponding author.

### **AI Use**

AI tools (ChatGPT, OpenAI) were used only for refinement. No AI system was used to generate original scientific claims, data, or interpretations, which remain entirely those of the author.

### **Ethics Statement**

For studies involving human participants, the authors confirm that the research complied with relevant institutional and national ethical standards. Ethical approval was obtained where required, and informed consent was secured from all participants prior to data collection. If ethical approval was not required, the authors confirm that the study adhered to applicable ethical guidelines.

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## Student Engagement in Sustainability through Work Placements

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### Abstract

Understanding how students engage with sustainability during work placements represents a critical gap in education for sustainable development. This study explores undergraduate Business School students' engagement in and learning from sustainability-related projects during work placements. While existing research shows the benefits of placements for student learning and employability, sustainability-related engagement and learning are underexplored. This study addresses this gap through a qualitative study which explores the nature of sustainability-related placement roles, how placement learning experiences shape student development, and how sustainability-related experiences can be effectively embedded into university preparation processes. The findings indicate that, although sustainability is rarely explicit in placement role specifications, there are numerous opportunities to engage informally, particularly when students proactively seek them. Through the conceptual lenses of self-efficacy and career identity, the study provides recommendations for further research, educational institutions and workplace providers.

**Keywords:** placements, sustainability, student engagement, self-efficacy, career identity

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## 1. Introduction

This study follows the premise that if ‘every job is a sustainability job’, as suggested across policy, industry and educational bodies, such as the 'Environmental Association of Universities and Colleges' (EAUC, 2023) (a membership body for post-16 education), then every placement could enable sustainability-related workplace learning and experiences. Inspired by Donald and Hughes' (2023, p. 4) provocation that "The time has come for innovative thinking and knowledge sharing around the design, delivery, and assessment of placement modules", this project aims to explore the extent and nature of placement student engagement in, and learning from, sustainability-related projects. Higher education represents a life stage in which values are formed and consolidated, thereby establishing career directions (Donald & Healy, 2024), and placements provide experiential opportunities. Despite significant literature on education for sustainable development (UNESCO, 2017) and research emphasising the importance of connecting sustainability-related learning with career development (Shtaltovna, 2024), little is known about sustainability-related learning and engagement during placements.

As a small-scale, exploratory study within a single institution, the research was designed pragmatically to examine the extent and nature of student engagement with and learning from sustainability during work placements. The research involved interviews with students, designed to gain insight into the following research questions (RQ):

RQ1. If students engage in sustainability-related projects while on placements, is it explicit or implicit within the role?

RQ2. What are students' perceptions of how engagement in sustainability-related projects during placements develops their employability?

RQ3. How might sustainability-related components be effectively embedded into university preparation processes?

Through an inductive analytical approach (Thomas, 2006), the constructs of self-efficacy and career identity, which are frequently used in the literature on placements, internships, and work-integrated learning, are employed to frame the analysis of student interviews. Self-efficacy concerns individual belief in capabilities, which influences performance and resilience (Bandura, 1977). Career identity concerns the sense of self that an individual constructs, shaping how they navigate their professional working experiences (Savickas, 1997). Career identity is discussed here as a foundation for self-efficacy. The study provides a new application of these constructs to understanding student engagement in and learning about environmental and social sustainability within placements. It also provides practical implications for the operationalisation of placements for enhancing sustainability-related learning.

## 2. Building Career Identity and Self-efficacy through Placements

Self-efficacy is a commonly cited benefit of placements and internships. For example, Tsai et al. (2017) found that ‘performance accomplishments’ and related feedback through internships can strengthen career decision self-efficacy. Developmentally, by “doing something new, being someone new, and getting recognised as someone new, a placement student's understanding of themselves and their skills and abilities (i.e., their self-efficacy) will change” (Inceoglu et al.,

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2019). The process of acquiring new skills aligns with their self-perception as emerging professionals.

*Self-efficacy* concerns beliefs in one's capabilities, influencing both performance and endurance/resilience (Bandura, 1977) and is considered a key component of career constructivist theory (Savickas, 1997). Career construction theory suggests that through mastery of learning experiences, an individual can turn learning challenges into opportunities to build confidence and resilience. This, in turn, contributes to the development of career identity. The relationship between self-efficacy and career identity is evident in Dacre Pool and Sewell's (2007) CareerEDGE model, which situates self-efficacy (including self-esteem and self-confidence) as central to career development through personal learning and identity formation. The model is applied here to generate insights into the formation of sustainability-related self-efficacy, self-esteem, and self-confidence.

Self-efficacy is akin to the concept of *self-regulation*, which Smith and Curtis (2020) describe as students' ability to reflect and take informed action based on this reflection. Reflective self-regulation helps build a *pre-professional identity* (Jackson, 2017) grounded in self-awareness and observation of others. From a career constructivist perspective (Savickas, 1997) reflexive practices are a form of identity-making through which individuals make sense of who they are and who they wish to become professionally. Smith and Curtis's (2020) UK study on scaffolding support for workplace transitions is relevant to this study's examination of sustainability-related self-efficacy. For example, it can be posited that students could helpfully reflect on and observe sustainability-related behaviours in others, both before and during placements. Alignment between learning contexts is essential, especially in connecting academic learning with workplace experiences. In a study of placements for university students in China, Li et al. (2024) found significant benefits and confirmed the conclusions of other global studies (Thi Ngoc Ha & Dakich, 2022; Zehr & Korte, 2020) that students frequently overlook the connections between 'classroom and workplace' learning. This means that opportunities to develop both sustainability skills and career identity may be missed.

Empirical studies on sustainability-related learning and placements are lacking, although featured within broader education for sustainability research. For example, in the analysis of the influence of self-efficacy beliefs on how sustainability is integrated into personal and professional lives of university students in Turkey, Demirci and Teksöz (2017) highlight the value of experiential learning of placements, enabling 'transformational learning' (Mezirow, 2016). Applied to the career literature, such profound learning experiences may contribute to the construction of a *vocational personality* (Savickas, 1997). This provides a persuasive rationale for nurturing and integrating sustainability-related learning in placement roles.

Hughes (2023) cautions that students struggle to connect work-integrated learning experiences to their career growth, which limits the identification of targeted learning opportunities and the communication of their achievements. In the context of sustainability-related learning opportunities, the importance of nurturing students' self-efficacy is evident in the continued scaffolding of learning and in the use of every opportunity to support students' career identity development.

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### 3. Methods

This study aims to examine students' experiences of sustainability during work placements, understand how these experiences contribute to their employability, and identify implications for university placement preparation processes. This section sets out the methodological basis of students as partners, followed by how interviews were designed and analysed.

#### 3.1. Design Context – Students as Partners

Funding by the authors' university's Centre for Academic Enhancement and Development, which enabled the recruitment of two student partners as co-researchers, who participated in the research project from conceptualisation through to analysis, with one student listed as a co-author of this article. Students as active partners/co-creators reflect an established approach in higher education research (Healey et al., 2014). Adopting a co-creation model in this research enables students to bring their lived experience to research design and data collection. Positioning student partners as interviewers enabled student-student discussions grounded in shared firsthand experience and rapport within a similar age cohort. The selection criteria for student partners were that they be in their final year and have completed a placement. One student partner withdrew midway through the study for personal reasons at a very early stage; this was unfortunate, but it did not affect the study.

The positioning of student partners as interviewers was a deliberate methodological choice (and indeed the premise upon which modest university funding was granted). Student-to-student interviews were expected to facilitate greater openness and rapport, given the shared experience of undertaking a placement and navigating sustainability within it. Furthermore, partnership pedagogy, in which students are partners in educational research, has been shown to enhance students' professional skills and contribute to identity development (Lau & Zheng, 2025), thereby constituting an essential contribution of this study.

Work placements are integral to the School and the university's education and employability strategy. At the time of the study, students could choose to seek and undertake a 40-52 week placement during the third year of the degree (thus extending the degree to a fourth year), in or outside the UK. Students are supported in finding a placement through a second-year module. During the placement, students are supported by an academic tutor and an organisational line manager to complete a portfolio of reflective exercises. Similarly, sustainability-related learning is a core component of the programme's learning requirements. The positionality of the research team is recognised as shaping the assumption that sustainability-related learning is relevant across placement roles, regardless of sector, and that sustainability is important to business practice; a reflexive approach was thus maintained throughout.

#### 3.2. Interview Design and Process

An interview methodology was selected, given the exploratory nature of the research, the ability to gather retrospective insights, and the need for interviewer prompts to elicit and guide conversations in which sustainability was more implicit in student projects. The academic team collaborated with student partners to develop and pilot an interview guide. Interview questions explored the student's role specification and whether it involved sustainability, either explicitly or implicitly (RQ1); any sustainability-related learning and experiences and how these were

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perceived to develop employability capital (RQ2); and perceptions of related university processes (RQ3).

Following ethical approval (UREC registration no. L24325), 214 students currently on placement or returned to the final year of study after a placement year were invited via email to participate in an online, audio-recorded interview conducted by a student partner. The invitation to participate explained that this was an opportunity to reflect on the role of sustainability in placements, adopting a broad definition that encompasses the Sustainable Development Goals, environmental, diversity and inclusion, ethics, charitable/volunteering projects, governance, and related areas. While all business school students formally study sustainability in core modules, this is not explicitly reflected in the course title. Therefore, students' interests and familiarity vary.

All interviewees provided informed consent before participation; supporting documentation is available from the authors upon request. The student partners were briefed on ethical requirements, including the protection of interviewees' confidentiality and anonymity, throughout the research process. Students, as interviewees, sign non-disclosure agreements as part of the placement process, so both the interviewer and the interviewee were aware of potential sensitivity regarding the employer, should it arise (although no concerns were raised).

Between April and June 2024, twenty-three interviews were conducted. This represents an eleven per cent response rate. Thirteen interviewees were female, and ten were male. Similarly, thirteen were currently on placement, and ten had returned to university. Interviews lasted an average of thirty minutes. As an exploratory study, twenty-three interviewees provided a sufficient basis for proceeding with the analysis. As the interviewees were not recruited explicitly based on prior sustainability knowledge, the interviewer's expertise in 'teasing out' more implicit examples of sustainability engagement was necessary. The authors worked closely with the student partners to develop these skills and ensure a systematic approach, as sustainability, when viewed as part of ethics, governance, environment, and social/community/wellbeing, has broad application. When these aspects are not linked to formal job roles, it may not be evident to students how their experiences relate to organisational and professional sustainability practices unless this is explored through open conversation. Through a diligent process of student partner recruitment, the student in this study had experience in a family business committed to sustainability principles, significant expertise throughout the programme/placement, and was thus able to draw out such nuances in discourse.

### **3.3. Interview Analysis**

All 23 interviews were transcribed using Zoom and anonymously coded in NVivo 14. The student partner, under the guidance of the academic team, conducted an initial round of coding aligned with the research questions. This was approached descriptively, following the research questions concerning experiences of sustainability during placements (RQ1), the perceived personal and organisational benefits of engagement (RQ2), and reflections on university processes and support (RQ3). The academic research team then conducted a second review, refining codes into clustered descriptive themes according to each research question, such as 'limited choices/competitive market' (RQ1), 'belief in personal impact/contribution to organisational change' (RQ2), and 'value of reflective assessment/need for clearer prompts' (RQ3).

Conceptual, interpretive coding was then carried out by the academic team, based on the sensitising concepts (Bowen, 2006) of self-efficacy (e.g., confidence, belief, resilience) and career identity (changes in self-view, clarification of career direction, alignment with organisational values). An iterative, collaborative process reduced individual interpretive bias and enhanced the reliability of the findings. It was not deemed necessary in this exploratory study to record students' programmes of study or the sectors or sizes of organisations in which students had placements. However, interview responses indicate that employers were highly diverse.

Throughout methodological discussions, roles as educators invested in sustainability education, alongside similar 'invested' interests among recruited student interviewers and possibly among students who volunteered for interviews, were recognised. It is acknowledged that educator positionality is grounded in an assumption that sustainability learning can be relevant across placement roles, and attitudes are shaped by institutional context. It was considered that the students interviewed may not immediately recognise sustainability within their roles, and that some probing may therefore be required to elicit its articulation. Reflexive team discussions during analysis helped critically examine possible interpretive bias.

#### 4. Findings

The findings are presented according to the leading conceptual coding themes related to self-efficacy and career identity, as identified by the academic team in the final stage of coding (as outlined in the previous section). The quotations in the tables are representative examples of the codes within each conceptual interpretive theme and are aligned with the research questions.

##### 4.1. Sustainability as an Influencing Factor in Placement Choice

The interviews began by asking students whether sustainability had featured in their placement search and choice. Several interviewees reported taking the placement because they had few other choices. While this does not mean that students are not motivated by sustainability, it may indicate that it was not a significant enough factor or did not influence decisions due to limited options. The quotes in Table 1 illustrate a key theme of *pragmatic decision-making* based on limited opportunities or choices rather than values alignment (R12, R10, R5). This can be seen as limiting the potential for the development of sustainability talent in early-stage careers. *Values-based attraction* was also evident, whereby sustainability commitments influenced students' placement choices (R8). This indicates that while sustainability is not currently a leading factor for most students, it can serve as a differentiator for sustainability-engaged students when organisational commitments are both available and visible.

TABLE 1: INTERVIEW QUOTATIONS – INFLUENCING FACTORS IN PLACEMENT CHOICE

Quotations	Self-efficacy	Career identity
'Of course, [sustainability] does matter to me, but realistically at that point I was just trying to find a placement in the industry which I want to break into" (R12).	Pragmatism based on opportunity rather than values alignment	Choices constrained by context
'There wasn't really that much out there ... it was quite hard to find something" (R10).	Pragmatism based on low perceived control	Choices constrained by context

<i>'It was quite competitive coming out of COVID. Placements weren't readily available, so anything I got I was quite grateful for, and just snapped up the first offer I got' (R5).</i>	Pragmatism based on low perceived control	Choices constrained by context
<i>"The company as a whole had strong sustainability foundations that they stuck to. That's sort of what pushed me in the direction of looking at more sustainable companies for my placement" (R8).</i>	Values-based attraction	Identity anchors in sustainability

Source: own compilation

#### 4.2. Sustainability Roles and Opportunities tend to be Implicit rather than Explicit (RQ1)

Generally, students did not recall job descriptions explicitly detailing sustainability opportunities or roles. Table 2 presents quotations that illustrate limitations and opportunities for *anticipatory self-efficacy* and career identity development through formal cues, such as how sustainability is communicated in formal recruitment materials. Some students recalled elements of sustainability information communicated in other organisational materials (R6). Although a single case, it illustrates that an organisation that emphasises the importance of sustainability on its corporate website does not necessarily incorporate this in job descriptions. Other students did not feel strongly about whether sustainability should be addressed in job descriptions. Still, some perceived potential value in this (R10, R2) - noting that explicit sustainability content could signal organisational acknowledgement and create a more positive impression, even if it didn't influence placement decisions.

TABLE 2 – INTERVIEW QUOTATIONS – EXPLICITNESS OF SUSTAINABILITY ROLES AND OPPORTUNITIES

Quotations	Self-efficacy	Career identity
<i>"They have information about [sustainability] on their website, on the values, the culture. That's the place where they have the information, but .... I don't think they had information on the application website" (R6).</i>	Limitations - Anticipatory efficacy	Limited formal cues for early identity shaping
<i>"I think it's really good to have it in a job description.... It just gives people the option and lets them know the organisation have acknowledged it" (R10).</i>	Opportunities - Anticipatory efficacy	Support for more formal cues for early identity shaping
<i>"I don't think it would have swayed me in any way, but it definitely would make me think more fondly about the company and have a better judgment of it" (R2).</i>	Opportunities - Anticipatory efficacy	Support for more formal cues for early identity shaping

Source: own compilation

#### 4.3. Opportunities for Sustainability-related Learning (RQ1)

The quotes in Table 3 illustrate diverse individual and organisational reasons for limited engagement in sustainability-related learning, which are coded into two main themes: building self-efficacy by *navigating organisational complexity*, such as workplace pressures and operational demands. These quotations aligned with identity building through understanding

organisational boundaries (R14, R21) or through aligning individual and organisational values (R18, R15).

Overall, even where organisations were known to be actively committed to sustainability goals, their day-to-day relevance to placement students was not explicit. In some cases, students proactively asked about sustainability and found managers lacked knowledge (R14). Another observed a disconnect between employee commitment and management actions (R15). For others, perceived organisational realities acted as barriers to engagement (R21, R18). Other student quotes indicate no connection between self-efficacy or career identity development and perceived non-sustainability of task focus, and therefore did not perceive these as relevant to role responsibilities or learning priorities (R7, R2).

TABLE 3: INTERVIEW QUOTATIONS – OPPORTUNITIES FOR SUSTAINABILITY-RELATED LEARNING

Quotations	Self-efficacy	Career identity
<i>“I went to my manager, who didn't know that much about it. When I did a couple of intern functions, where the bigger bosses rock up, and were asked those kinds of questions, it got interesting trying to pick apart what they were saying” (R14).</i>	Navigating organisational complexity	Identity building - understanding organisational boundaries
<i>“On a grassroots level, employees want to help and want to reduce CO<sub>2</sub>. But when it comes to the management, they say they do, but their actions don't reflect it. We'll give you £2,000 for a wild meadow, but we're not actually going to make a concrete investment in a green wall or in putting solar panels on our large factories... We're going to say we love it and then not do anything about it” (R15).</i>	Navigating organisational complexity	Identity building – aligning individual and organisational values
<i>“We've had to do a lot of air shipments - we need stuff to sell stuff because people want stuff, and we just have to do it. There's no option. I mean, it's either that or we just wait for 6 months” (R21).</i>	Navigating organisational complexity	Identity building - understanding organisational boundaries
<i>“I think they wanted to do a lot more sustainability. But we had a big wave of redundancy, so I think profitability was a big thing” (R18).</i>	Navigating organisational complexity	Identity building – aligning individual and organisational values
<i>“I could have probably asked, but I didn't have the time to go looking for what the sustainability practices were in my company, because it wasn't something that was directly affecting (my) job” (R7).</i>	Non-sustainability task focus	Sustainability not integrated into identity
<i>“Once I've learned how to do the basics, such as using software, designing things, writing copy, then I would go down that avenue and look into sustainability. But for a first jump into learning things, it would probably feel a bit too specific for me” (R2).</i>	Non-sustainability task focus	Sustainability not integrated into identity

Source: own compilation

#### 4.4. Student Perceptions of Personal Benefits from Sustainability-related Learning in Placements (RQ2)

The quotes in Table 4 represent themes in perceptions of personal benefits in building self-efficacy through *personal agency/mastery* by taking initiative to seek sustainability opportunities, which enable skills development, and build career identity by aligning personal interests with organisational values (R6, R15, R14). Another student described how workplace experiences directly shaped career direction (R1), thereby demonstrating the pragmatic career-shaping outcomes of placement experiences.

TABLE 4: INTERVIEW QUOTATIONS – PERCEPTIONS OF INDIVIDUAL BENEFITS

Quotations	Self-efficacy	Career identity
<i>“I was involved in the Muslim network, and I was the head of the Ramadan 2024 challenge. When you reach out, even if you say that you don't have experience, they accept you. I clearly told them I don't have experience, but I immediately got the job” (R6).</i>	Personal agency, mastery	Identity building – aligning individual and organisational values
<i>“I went straight to the sustainability manager when I got there and said, ‘Is there something I can do?’ And he said, ‘Not right now, but let me get back to you. And then a couple months later, I was running the project” (R15).</i>	Personal agency, mastery	Identity building – aligning individual and organisational values
<i>“If you combine a bit of knowledge and a drive, there's hopefully empowerment to make something happen ... if you think this really matters and this is the thing I'm going to really push for in my one year here, that can really be a driving force” (R14).</i>	Personal agency, mastery	Identity building – aligning individual and organisational values
<i>“Because of everything that I saw on my placement around well-being, I've now steered my whole career in that direction, or begun to do it” (R1).</i>	Personal agency, mastery	Identity building – aligning individual and organisational values

Source: own compilation

#### 4.5. Student Perceptions of Organisational Benefits from Sustainability-related Learning during Placements (RQ2)

Table 5 presents quotations illustrating two sub-themes in perceptions of organisational benefits through *generational agency*: the belief that younger workers bring greater sustainability consciousness and a drive for change (R8, R11, R7), and the ways in which this can be linked to career identity building as a change agent. For others, self-efficacy was built through *mastery*-based learning that delivered tangible organisational value through specific sustainability projects (R12, R15), thereby linking to career identity development through the recognition they gained. The examples provided clearly demonstrate how placement students can contribute meaningful organisational value when given opportunities to engage with sustainability.

TABLE 5: INTERVIEW QUOTATIONS – PERCEPTIONS OF ORGANISATIONAL BENEFITS

Quotations	Self-efficacy	Career identity
<i>“I think a lot of the audience that are really pushing sustainability are the younger ones, because we're the ones that ultimately are going to be living in the future of, the planet dying. Younger people bring the desire for change to companies that might be a little bit stuck in their ways. It's just a fresh, new, forward way of thinking” (R8).</i>	Generational agency	Identity building – change agent
<i>“For the majority of people who are working in a higher level, nothing is going to happen in their lifetime. It might not even affect us, but it'll certainly affect our children and grandchildren. So I think that we'd be more conscious about it than other people” (R11).</i>	Generational agency	Identity building – change agent
<i>“It's just a very different outlook on things. I guess it's a generational thing, like a lot of these big companies are run by a man in his sixties or something. And so someone that's our age coming into it has spent our entire lives hearing that we need to make a change because we just cannot go on like this” (R7).</i>	Generational agency	Identity building – change agent
<i>“I did research on different companies that are holdings within an investment portfolio of ours. I had to identify what they're doing in terms of Diversity, Equality and Inclusion, and what score I would assign to them according to our internal framework” (R12).</i>	Mastery - contributions	Identity building – recognition
<i>‘I have been working on a sustainability project ...to reduce the single-use plastics in the cafeteria area. I have personally been leading and running... the group. And I've got support from the CEO and CFO for it, with projected cost reductions of about eight grand a year” (R15).</i>	Mastery - contributions	Identity building – recognition

Source: own compilation

#### 4.6. Student Attitudes towards University Processes (RQ3)

Table 6 presents quotations representing sub-themes in student perceptions of university processes, illustrating self-efficacy through *mastery*-building via assessed work (R8) and transformative learning through reflection (R16), which can be linked to career identity development through employer recognition and deeper self-awareness. There were also suggestions for more explicit sustainability prompts in assessment guidance (R18).

It was apparent that some students struggled to recall or identify sustainability-related learning opportunities in their academic programmes before placement, even though all programmes included such content. For most students interviewed, assessment involves a reflective portfolio and a presentation to the company and university tutor. The findings indicate the value of explicitly explaining to students how academic learning on sustainability can be related to placements, and of ensuring that this is also set out in assessment materials.

TABLE 6: INTERVIEW QUOTATIONS – ATTITUDES TOWARDS UNIVERSITY PROCESSES

Quotations	Self-efficacy	Career identity
<i>“A lot of my assessed presentation focused on sustainability and the owner of the company ... was so impressed they asked me to send it to them, and they’ve actually used it with a couple of clients” (R8).</i>	Mastery building - assessment tasks	Identity building – recognition
<i>“My view of how my view of corporate sustainability has changed through writing about my experience” (R16).</i>	Mastery building - transformative learning	Identity building – personal values
<i>“Sustainability should be included in the skills matrices, with examples of how it can be linked to placements to act as a “prompt” (R18).</i>	Suggestion for efficacy building through support	Identity building – suggestion for support

Source: own compilation

## 5. Discussion

This study set out to explore student engagement and learning about sustainability during placements, and the findings have been analysed through the concepts of self-efficacy and career identity.

### 5.1. Opportunities for Student Self-efficacy through Engagement with Sustainability during Placement

A key observation is that sustainability is rarely a leading factor in placement choices, even when personal values align, and that placement decisions are pragmatic, driven by a competitive labour market and role availability. During placement, some did not pursue sustainability-related learning because it seemed peripheral to the role and was perceived as raising organisational concerns. In contrast, others harnessed prior knowledge and personal interest, either taking opportunities to engage when they arose or seeking them out. These experiences enabled the development of self-efficacy and career identity by navigating formal organisational structures, acting proactively, and interpreting organisational cues, among other activities. This illustrates self-efficacy in terms of belief in capability (Bandura, 1977).

This underscores the need for a sustainable career ecosystem in which students, educators, and organisational leaders consider how placement learning experiences explicitly connect to broader planetary and societal goals, regardless of role. It also highlights how prior sustainability-related learning in the curriculum can be effectively presented to employers and students as a resource for use during placement. By doing so, the frequency with which placement students decouple placement tasks from university learning (Li et al., 2024) could be reduced – leveraging the benefits for all. Currently, unless students or placement educators are interested in and committed to sustainability, it is unlikely to remain within the placement's scope. By encouraging student-employer discussions about how projects and tasks relate to environmental and social sustainability, new perspectives can emerge regarding how a student perceives their role and contribution. In turn, such experiences will build efficacy and career identity, alongside a career trajectory that supports global sustainability goals.

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## 5.2. Placements as a Sustainability Career Narrative Building

This study confirms that sustainability-related projects during placements provide a rich opportunity for students to bring personal passions and awareness, associated with *self-identity capital* (Donald et al., 2023) into a workplace context. Several students described engaging with environmental, equity, or ethical workplace issues that influenced their career aspirations, self-confidence, and beliefs. Consistent with carer construction theory (Savickas, 1997) such experiences become meaningful within career identity development as students navigate organisational tensions and realities, prompting them to reflect on and evaluate their personal values.

Cripps and Bobeva (2025) illustrate the personal and professional value of building individual self-awareness of values and strengths aligned to organisational and global sustainability goals. The findings here directly illustrate how placements provide a fertile ground for building ‘stories’ as part of both personal and professional identity. Notably, several students also identified the importance of soft skills, such as communication and persuasion, in identifying and engaging in sustainability-related projects. Thus, opportunities for both reflection on individual value formation and the development of soft skills for sustainability are important to consider in the design of educational and placement programmes.

## 5.3. Making Sustainability Visible in Placement Recruitment and Organisational Practice

The study confirmed that students frequently engage in sustainability-related projects (both formally and informally), even though this is often not explicitly detailed in job descriptions. The implicit nature of sustainability in recruitment and role design processes is not reported to influence application decisions, but does influence perceptions of the organisation. From a self-efficacy perspective, limited explicit signalling of sustainability opportunities can limit ‘anticipatory’ learning and opportunities for values alignment.

The findings indicate that students could identify tangible organisational benefits from their engagement in sustainability-related projects, thereby contributing to their self-efficacy through confidence-building and a sense of legitimacy. Therefore, organisations could consider making sustainability visible in placement job descriptions and recruitment materials to attract talent, enhance engagement, and support sustainability and people development strategies. This is especially relevant to organisations seeking to recruit values-aligned talent. Indeed, Onyido et al’s (2022) study of sustainability-themed placements suggests that organisational benefits can be derived from a ‘circular approach’ in which learning from one cohort’s experience informs the next.

## 5.4. Enabling Pro-active Sustainability Learning through Placement Design and Reflection

The findings emphasise the importance of structured reflection in enabling students to recognise, develop, and communicate sustainability-related learning. Placement assessment tasks, such as employer presentations, have been shown to build self-efficacy by increasing confidence from employer feedback, and to feed learning experiences into career identity by shaping insights into personal values. This aligns with Donald and Hughes’ (2023) emphasis on scaffolding reflection, especially for experiences that may not immediately appear

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‘successful’. Students’ reflections on the apparent absence of organisational commitment to sustainability and opportunities are shown, through the findings, to be insightful into how this aligns with their personal values and what they might want to shape in the future as they build career identity.

Sustainability-related learning is therefore recommended to be embedded in university and employer processes for goal setting, skills matrices, and associated workplace discussions from the outset. Despite the university's and programme's commitment to sustainability, the findings indicate that more can be done in formal placement preparation and assessment to encourage student recognition of and agency for sustainability-related learning and engagement opportunities within workplace roles.

## **6. Conclusion and Recommendations**

### **6.1. Conclusion**

This study sought to explore the extent and nature of sustainability-related engagement and learning during placements, and their contributions to self-efficacy and career identity. Overall, the findings show that while sustainability is rarely explicit in placement roles specifications, there are many opportunities to engage informally, especially where proactively sought by students. Educational programmes should encourage students to pursue such experiences as they can build confidence, inform awareness of personal values, and further shape employability identities and narratives. In doing so, students can create a sense of self-efficacy and career identity, both of which are essential for employability.

Organisational priorities and sustainability resourcing are seldom clear-cut, and navigating these tensions is fundamental to developing future leadership skills. In this regard, placement students may need opportunities to practise sensitively steering organisational conversations on contentious issues.

The findings from this study have broad implications for the development of sustainability talent pipelines. By making sustainability opportunities explicit in placement descriptions and embedding sustainability competencies into induction and development processes, organisations across sectors can simultaneously address talent acquisition while advancing sustainability agendas. It is time to position placements as part of an employability ecosystem in which future professionals can develop workforce capabilities aligned with personal and organisational values and aspirations for sustainability transitions.

### **6.2. Recommendations**

Based on the study’s findings and conclusion, the following recommendations are proposed for research, institutional and organisational practice.

#### *6.2.1. Recommendations for Further Research*

1. A longitudinal study of placement students, from pre-placement through to graduation and beyond, would illuminate the impact of placement-based sustainability learning. This could follow Edwards’ (2014) study on the impact of placements on students’ self-efficacy. This might focus on objective measures, such as skills and

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competencies and the graduate roles undertaken, as well as more subjective measures, such as values, aspirations, and perceptions of self-efficacy.

2. Drawing on the environmental research work of Nielsen (2017), the concept of self-regulation could be employed to examine the ‘intention-behaviour gap’ whereby students set and strive for sustainability-related goals but do not always adhere to them (linking to a career ecosystem perspective on varying influences across time and context).

3. Apply a self-efficacy scale, such as Demirci and Teksöz’s (2017), to provide a more quantitative measure (adapted for placements) of students’ perceptions of how they might integrate sustainability into professional contexts.

4. A macro-level investigation of placement role descriptions (and recruitment materials) to ascertain the degree to which they feature sustainability-related skills and opportunities.

5. The student-staff partnership approach to research in this paper has positively contributed to the richness of research findings, and it aligns with calls to provide such opportunities to enhance student agency and provide research benefit (Payne et al., 2023).

#### *6.2.2. Recommendations for Educational Institutions*

1. Connect sustainability-related learning with soft skills, such as communication and influence, to enable students to be ‘workplace ready’ through linking academic programmes of sustainability-related learning with employability skills. Placement assessment instruments, such as reflective portfolios, should explicitly consider sustainability-related learning. The approach outlined by Cripps and Bobeva (2025) to ‘Career storytelling for the Sustainable Development Goals’ could be helpfully applied to placement students.

2. Encourage student reflection on individual and organisational values alignment, so that they are empowered to navigate choices, navigate organisational dynamics and build a career identity that brings personal meaning and satisfaction.

3. University placement-related administrative and assessment processes should effectively integrate the importance of sustainability-related learning opportunities and the value this can bring to both students and employers. Hughes’ (2023) recommendation to benchmark and communicate competencies during, rather than post-experience, is especially valid for meaningful sustainability-related engagement and learning.

#### *6.2.3. Recommendations for Placement Providers*

1. As recommended in the study of early career talent and sustainability by Cripps and Louw (2025), employers could attract talent and gain generational appeal by including explicit sustainability-related opportunities in their placement offers to students.

2. To engage sustainability and human resources teams in working with placement student line managers to facilitate sustainability-related learning and engagement opportunities.

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### 6.3. Limitations

The results here are subjective and interpretive, and as a qualitative, exploratory study, are constrained by a limited sample size. Extending the study to more students across a larger number of institutions would help gain more transferable insights. The study here was limited to Business School programmes; therefore, replicating it across other disciplines would be informative. The findings should be interpreted as reflecting the institutional context and may not be transferable to universities with different organisational commitments and approaches to sustainability and placement-related learning.

As the invitation to participate emphasised the importance of understanding sustainability in placements, this may have skewed the interviewee profile toward those with some interest in sustainability. Although the interviews were conducted by a student partner with the deliberate intention of minimising social desirability bias through peer-to-peer discussion, this cannot be discounted. As a single-method study, the interview data rely on retrospective self-reporting and lack triangulation with employer insights. It would be particularly advantageous to obtain line managers' views on promoting sustainability-related learning during placement. Finally, although the coding of interview quotations was introduced to ensure consistent interpretation across the team, the limited sample size and interpretive approach do not enable a structured comparison of students' attitudes and experiences.

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### **Data Availability**

Data supporting the conclusions of this study can be made available upon reasonable request from the corresponding author.

### **AI Use**

The authors declare that any use of artificial intelligence tools in the preparation of this manuscript was limited to ChatGPT for technical and language support. The authors further affirm that all cited sources are real, accurately referenced, and have been verified by the authors. Full responsibility for the content and integrity of this article remains with the authors.

### **Ethics Statement**

For studies involving human participants, the authors confirm that the research complied with relevant institutional and national ethical standards. Ethical approval was obtained where required, and informed consent was secured from all participants prior to data collection. If ethical approval was not required, the authors confirm that the study adhered to applicable ethical guidelines.

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# GILE Journal of Skills Development

## Emotional Intelligence as Enacted Employability in AI-Mediated Intercultural Consulting Workplaces

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### Abstract

In AI-mediated intercultural consulting workplaces, professionals collaborate across cultural and functional boundaries while navigating complex interpersonal demands. In such environments, employability, particularly for early-career professionals, depends on emotional intelligence as a workplace competence enabling constructive cross-functional and cross-cultural collaboration. Despite its recognised importance, empirical research examining emotional intelligence as an enacted employability capability in consulting contexts remains limited. This mixed-methods study investigates the association between self-reported emotionally intelligent behaviour and cross-functional collaboration within a multinational professional services workplace characterised by international teams. The sample comprised 37 professionals across analytical, consulting, and managerial roles. Correlation and regression analyses examined whether self-reported emotional intelligence relates to reported collaboration. Results indicate a statistically significant positive association ( $r = .38$ ,  $p = .022$ ), with emotional intelligence explaining 14% of the variance in collaboration. Given the single organisational context and sample size, findings are interpreted as exploratory and context-specific rather than generalisable. Semi-structured interviews explored how professionals enact emotional intelligence in everyday workplace interaction and AI-mediated communication. Participants highlighted emotional self-regulation, empathy, and adaptive communication as supporting intercultural understanding and willingness to speak up. AI-assisted tools were experienced as supportive preparation mechanisms rather than substitutes for relational competence. The findings suggest that emotionally intelligent behaviour may function as an enacted employability capability, particularly relevant for early-career development, supporting psychologically safe collaboration in AI-mediated intercultural consulting workplaces.

**Keywords:** early-career professionals, emotional intelligence, employability, intercultural teams, skill development, artificial intelligence

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## 1. Introduction

In today's digital economy, early-career professionals are increasingly expected to work across cultural, functional, and organisational boundaries. In consulting, technology, and project-based services, often operating as virtual network organisations, collaboration regularly involves colleagues from different professional backgrounds, national cultures, and time zones, often under time pressure and changing client demands. These environments, frequently characterised as volatile, uncertain, complex, and ambiguous, place demands not only on technical competence, but also on communication, emotional regulation, and the ability to collaborate effectively under pressure. As a result, employability is increasingly understood as a set of transferable capabilities that include interpersonal and relational skills alongside domain knowledge (Tushar & Sooraksa, 2023), a perspective that directly informs the present study's focus on emotionally intelligent behaviour in collaborative consulting contexts.

Emotional intelligence (EI) has been conceptualised in multiple ways within organisational and psychological research. According to Mayer and Salovey (1997), EI consists of interrelated skills involved in perceiving, using, understanding, and managing emotions in oneself and others. In contrast, Goleman (1998) proposes a mixed model emphasising competencies such as self-awareness, emotional regulation, empathy, and social skills in workplace interactions. Subsequent organisational research has linked EI to leadership effectiveness, team functioning, and interpersonal dynamics in groups (e.g., Coronado-Maldonado & Benítez-Márquez, 2023; Truninger et al., 2018). However, much of this research relies on self-report or competency-based measures, leaving limited insight into how emotionally intelligent behaviour is enacted in everyday, cross-functional and intercultural work contexts.

At the same time, contemporary work practices in consulting and professional services are increasingly shaped by digital collaboration and AI-assisted tools. Platforms such as Microsoft Teams, Slack, and shared project management systems structure daily communication, coordination, and documentation in distributed teams. More recently, AI-assisted features embedded in productivity software, including automated text drafting, summarisation, and tone-support tools, have begun to influence how professionals prepare and frame communication (Bankins et al., 2023). Prior research suggests that these technologies not only support efficiency and clarity, but also shape workplace communication dynamics, trust, and interpersonal experience in collaborative work settings (Van Quaquebeke & Gerpott, 2024). This shift is particularly relevant for early-career professionals, whose participation and sense of psychological safety may be influenced by how communication is mediated and emotionally managed in digitally supported team environments.

Psychological safety provides a useful lens for understanding these dynamics. Edmondson (1999) defines psychological safety as a shared belief that the team is safe for interpersonal risk-taking, allowing individuals to speak up, ask questions, and express concerns without fear of negative interpersonal consequences. Empirical research shows that psychologically safe environments support learning behaviour, voice, and collaboration, particularly in complex and interdependent team settings (Edmondson & Lei, 2014; Frazier et al., 2017). In intercultural and cross-functional contexts, psychological safety is closely linked to how emotions are regulated, how feedback is delivered, and how interpersonal interaction is handled in practice.

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Against this background, the present study examines emotionally intelligent behaviour as an employability-relevant capability in intercultural consulting teams. Using a mixed-methods design, it investigates the relationship between emotional intelligence and cross-functional collaboration, and explores how emotionally intelligent behaviour and AI-assisted tools are experienced in relation to communication practices and psychological safety at work. The study pays particular attention to early-career professionals operating in digitally mediated, intercultural environments and aims to contribute applied insight into how emotional and relational skills support collaboration, participation, and skill development in contemporary professional settings.

## **2. Literature Review**

### **2.1. Emotional Intelligence as a Behavioural Capability in Intercultural Work**

Emotional intelligence (EI) has been conceptualised in multiple ways within organisational and psychological research. According to Mayer and Salovey (1997), EI refers to interrelated abilities involved in perceiving, understanding, using, and managing emotions in oneself and others. Goleman (1998) extended this perspective by emphasising emotionally intelligent behaviour in workplace interaction, including self-awareness, emotional regulation, empathy, and social skills. More recent organisational research frames EI as a behavioural capability enacted through observable practices rather than as a fixed trait, linking emotional competence to collaboration, learning, and performance in team-based settings (Gerbeth et al., 2022; Paik et al., 2019).

From a skills development perspective, EI is increasingly understood as a practical and learnable capability. Emotional competencies are expressed through managing reactions under pressure, responding constructively to feedback, and adapting communication to contextual cues (Melita Prati et al., 2003; Rosete & Ciarrochi, 2005). Such practices support coordination and reduce interpersonal friction in collaborative work (Rezvani et al., 2018; Stubbs Koman & Wolff, 2008). Importantly, emotionally intelligent behaviour is not confined to leadership roles; peers and junior team members also shape communication norms and relational dynamics through everyday interaction (Edelman & van Knippenberg, 2018).

For early-career professionals, emotionally intelligent behaviour is particularly salient. Limited positional authority and heightened evaluative pressure increase the importance of emotional self-regulation and interpersonal awareness. Research indicates that EI supports early-career professionals in managing uncertainty, engaging constructively with senior colleagues, and developing confidence in complex organisational contexts (Chen, 2025; Coronado-Maldonado & Benítez-Márquez, 2023). EI has also been linked to proactive career engagement and adaptability (Pirsoul et al., 2023; Wang et al., 2023), reinforcing its relevance as an employability-relevant capability in dynamic work environments.

Recent research on employability and skills management further emphasises that interpersonal and emotional capabilities are central to sustained participation in knowledge-intensive work (Clarke, 2018; Donald et al., 2019; Knight & Yorke, 2003). Skills development is increasingly understood as an ongoing process shaped through workplace interaction and feedback rather than formal instruction alone (Donald & Ford, 2023). Within this perspective, emotionally intelligent behaviour functions as a foundational capability supporting collaboration, inclusion, and professional growth.

Employability research further shows that early-career professionals entering international and intercultural work environments often encounter implicit differences in working styles and expectations. In some educational and organisational contexts, individuals are accustomed to

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detailed guidance, explicit instruction, and close supervision. When transitioning into European consulting and professional service environments, where autonomy and self-directed problem-solving are more strongly emphasised, these expectations can shift abruptly. Such differences reflect variation in prior learning environments and professional socialisation rather than skill deficits. Research on digitally ready soft skills highlights the importance of adaptive communication and intercultural awareness in navigating these transitions (Shtaltovna & Muzzu, 2021). Related work suggests that these adjustments are especially salient in intercultural employment contexts (Jackson et al., 2022; Tomlinson, 2017). Navigating such transitions often requires emotional self-regulation, adaptive communication, and the confidence to seek clarification or take initiative in the absence of explicit direction.

## **2.2. Communication, Collaboration, and Psychological Safety**

Effective communication and collaboration are core demands in project-based and intercultural environments. Research shows that communication quality shapes task coordination, information sharing, and the integration of diverse perspectives (Faraj et al., 2018; Salas et al., 2015). In cross-functional and intercultural teams, differences in professional norms and expectations increase the risk of misunderstanding, making respectful interaction and adaptive communication central to sustained collaboration (Hajro et al., 2017).

Psychological safety provides a useful framework for understanding these interactional dynamics. Defined as a shared belief that individuals can speak up without fear of negative consequences (Edmondson, 1999), psychological safety has been linked to learning behaviour, voice, and team effectiveness (Edmondson & Lei, 2014; Frazier et al., 2017; Newman et al., 2017). In diverse and interdependent teams, psychologically safe environments support participation and constructive disagreement (Rødsjø et al., 2024).

For early-career professionals, psychological safety is closely connected to employability. Limited authority heightens perceived interpersonal risk, particularly in hierarchical and intercultural contexts (Nembhard & Edmondson, 2006). Emotionally intelligent behaviour, including self-regulation and empathy, can function as a mechanism supporting psychologically safe communication and cross-functional collaboration.

## **2.3. AI-Assisted Tools and Emerging Skill Demands**

Digital collaboration platforms and AI-assisted tools increasingly shape professional interaction. In consulting and project-based contexts, AI-supported drafting, summarisation, and communication tools influence how messages are prepared and delivered. Rather than replacing interpersonal interaction, these technologies alter the conditions under which communication occurs.

Research on AI-enabled work suggests that such tools function as contextual enablers whose impact depends on user competence and organisational practices (Dwivedi et al., 2021; Raisch & Krakowski, 2021). While AI may support efficiency and clarity, social and relational aspects of work remain central. From an Industry 5.0 perspective, Rasool (2025) argues that technological advancement must be aligned with emotional, social, and ethical forms of intelligence to avoid marginalising human judgement in digitally mediated environments.

For early-career professionals, AI-assisted tools may support preparation and emotional regulation in situations involving uncertainty or perceived interpersonal risk. However,

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unreflective reliance on technological mediation may limit experiential learning if not embedded in supportive communication practices (Andersson et al., 2020). The growing integration of AI therefore reinforces rather than diminishes the importance of emotional and relational capabilities (Behn et al., 2024).

Despite extensive research on emotional intelligence, collaboration, and psychological safety, limited empirical work has examined emotionally intelligent behaviour as an employability-relevant capability within intercultural consulting environments shaped by AI-mediated communication practices. This study addresses that gap by examining how emotionally intelligent behaviour relates to cross-functional collaboration and psychological safety in contemporary consulting contexts.

### **3. Methods**

#### **3.1. Research Design**

This study adopts a sequential mixed-methods design to examine the role of emotionally intelligent behaviour and AI-assisted tools in intercultural consulting teams. The design combines quantitative survey analysis with qualitative interviews to address the following research questions:

- a) RQ1: How is emotionally intelligent behaviour associated with cross-functional collaboration in intercultural consulting teams?
- b) RQ2: How is emotionally intelligent behaviour experienced in relation to communication and psychological safety in intercultural consulting teams?
- c) RQ3: How are AI-assisted tools perceived in shaping communication practices and psychological safety in these team contexts?

To address RQ1, quantitative survey data were collected and analysed. Exploratory factor analysis (EFA) was used to examine the empirical structure of the emotional intelligence items and to inform construct operationalisation. Based on the factor structure and internal reliability analysis, emotional intelligence was operationalised as a single composite construct representing emotionally intelligent behaviour as an integrated, employability-relevant capability. Cross-functional collaboration was measured using a single item capturing respondents' reported frequency of working with colleagues across functional boundaries in project settings. Pearson correlation and simple linear regression analyses were conducted to examine the association between self-reported emotional intelligence and cross-functional collaboration.

Following the quantitative analysis, the qualitative phase was designed to explore and contextualise the observed association between emotional intelligence and cross-functional collaboration. Interview questions were informed by the survey findings and focused on how emotionally intelligent behaviour was enacted in practice, particularly in relation to communication dynamics, psychological safety, and AI-supported interaction.

To address RQ2 and RQ3, qualitative data were collected through four semi-structured interviews. Three interviews were conducted with professionals working in intercultural, cross-functional consulting teams at different levels of seniority, and one interview was conducted with an AI coach advising organisations on AI-supported collaboration. The interviews focused on emotionally intelligent behaviour, communication practices, collaboration dynamics, and the perceived role of

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AI-assisted tools in shaping psychological safety. Psychological safety was examined qualitatively as an experienced team climate, inferred from participants' accounts of speaking up, managing uncertainty, and navigating interpersonal risk in everyday team interactions.

### 3.2. Sample and Data Collection

Two complementary data sources were used to address the study's research questions: a quantitative survey examining the relationship between emotional intelligence and cross-functional collaboration (See Appendix A), and qualitative interviews providing contextual insight into workplace communication, psychological safety, and the use of AI-assisted tools (See Appendix B). This mixed-methods design enabled both statistical examination of associations and in-depth exploration of how emotional intelligence is enacted in organisational practice.

The quantitative instrument consisted of researcher-developed self-report items designed to capture observable emotionally intelligent behaviour in workplace contexts. The items were theoretically informed by established emotional intelligence frameworks (Goleman, 1998; Mayer & Salovey, 1997) and were constructed to reflect practical workplace behaviours rather than trait-based assessments. Item content aligned with core EI dimensions identified in the literature, including emotional awareness, self-regulation, empathy, and emotionally intelligent communication. The internal structure of the items was examined using exploratory factor analysis (EFA), and internal reliability was assessed using Cronbach's alpha.

Cross-functional collaboration was measured using a single self-report item capturing respondents' reported frequency of working with colleagues across functional boundaries in project settings. Given the exploratory case-based design, a single-item operationalisation was selected to capture a clearly defined indicator of cross-functional interaction within an organisational survey context.

The quantitative sample consisted of 37 professionals working in intercultural, cross-functional consulting teams within a multinational professional services organisation. Roles ranged from analyst and consultant positions to managerial and senior leadership roles, indicating a mixed-seniority organisational context rather than an exclusively early-career population. Table 1 presents the distribution of respondents' current roles.

TABLE 1. DISTRIBUTION OF RESPONDENTS' CURRENT ROLES

Role	Frequency	Percentage
Analyst/Junior Consultant	10	27%
Consultant/Associate	12	32%
Manager/Project Lead	9	24%
Senior Manager/Director	4	11%
Other	2	5%

Source: own survey data

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Participants were recruited through an internal organisational mailing list distributed to consultants working within an innovation-focused consulting unit of a large multinational professional services firm. The organisational unit specialised in innovation and digital transformation projects within a European-based multinational professional services context. Early-career professionals within this study were defined as individuals within approximately the first five years of full-time professional experience.

The invitation was sent to approximately 85 eligible professionals, all working within the same innovation-oriented consulting unit, of whom 37 completed the survey, resulting in a response rate of 43.5%. Participation was voluntary and anonymous. In order to preserve anonymity within a relatively small organisational subunit, demographic variables such as gender or detailed functional specialisation were not collected. The sample therefore reflects a shared organisational and intercultural workplace context rather than stratified demographic categories. The survey included Likert-scale items measuring emotional intelligence and reported cross-functional collaboration. Data were collected digitally and analysed using PSPP.

The qualitative component comprised four semi-structured interviews: three with consulting professionals from different seniority levels and one with an AI coach specialising in AI-supported collaboration. The consulting participants included one early-career analyst, one mid-level project manager, and one senior manager with cross-functional team leadership experience, all working in intercultural consulting contexts. The AI coach had experience advising organisations on AI-enabled communication practices and team development. Interviews were conducted with informed consent, audio-recorded, and transcribed verbatim. A voluntary non-probability sampling approach was used for the survey, and purposive sampling was applied for the interviews.

### *3.2.1. Measures*

The survey initially included ten Likert-scale items rated on a seven-point scale ranging from 1 (“strongly disagree”) to 7 (“strongly agree”). Eight items were designed to capture emotionally intelligent behaviour in workplace interactions, including emotional awareness, regulation, empathy, and emotionally informed communication. One item measured reported cross-functional collaboration in project settings, and one additional reverse-worded item reflecting perceived functional barriers was included for exploratory purposes.

Prior to factor analysis, the barrier item was excluded, as it did not conceptually represent emotionally intelligent behaviour. Exploratory factor analysis was then conducted on the eight emotionally intelligent behaviour items and supported a single-factor structure. Internal reliability was acceptable (Cronbach’s  $\alpha = 0.81$ ), and an overall emotional intelligence score was calculated as the mean of these eight items.

The cross-functional collaboration item did not load with the emotional intelligence items and was retained as a separate behavioural outcome variable in correlation and regression analyses.

Given the exploratory case-based design and limited sample size, measurement decisions prioritised parsimony and clarity over scale complexity. The use of a single behavioural item for cross-functional collaboration should therefore be interpreted as an exploratory proxy rather than as a comprehensive multidimensional measure of collaborative effectiveness.

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Psychological safety was not measured quantitatively. Instead, it was examined qualitatively as an experienced team climate, inferred from interview accounts related to speaking up, managing uncertainty, and navigating interpersonal risk in team interactions.

### **3.3. Data Analysis**

Quantitative analysis was conducted using PSPP. The analytical process included reverse-coding of negatively worded items, scale construction, and internal reliability testing using Cronbach's alpha. Exploratory factor analysis using principal component extraction was conducted to examine the structure of the emotional intelligence items and inform construct operationalisation. Given the exploratory design and limited sample size, principal component extraction was selected to identify dominant variance patterns rather than to confirm a predefined latent structure. No rotation was applied due to the emergence of a single interpretable factor. Correlation analysis and simple linear regression were used to examine the correlation between self-reported emotional intelligence and cross-functional collaboration.

Qualitative data were analysed using reflexive thematic analysis. Interview transcripts were reviewed line by line, and initial open codes were assigned to segments related to emotionally intelligent behaviour, communication practices, collaboration, AI-assisted tools, and psychological safety. Coding was primarily inductive, while informed by the study's research questions. Codes were iteratively refined and grouped into higher-order categories, resulting in three overarching themes: (1) emotional self-regulation under pressure, (2) empathy, hierarchy, and voice, and (3) AI-assisted tools as preparation support. Themes were reviewed for internal coherence and cross-case consistency across participants. Coding was conducted manually and involved two iterative cycles. Initial open coding was followed by thematic grouping and cross-case comparison to ensure conceptual consistency. Reflexive memoing was used to document analytical decisions and enhance transparency in theme development.

The interview with the AI coach was analysed alongside the other interviews as part of the same thematic dataset. Its contribution is treated as expert-informed contextual insight rather than as direct evidence of lived experience. Quantitative and qualitative findings are integrated at the interpretation stage and discussed in the Discussion section.

### **3.4. Ethical Considerations**

Participation in both the survey and interviews was voluntary. Interview participants provided informed consent prior to participation, and survey responses were collected anonymously. All interview data were anonymised using participant identifiers (A–D), and identifying organisational details were removed to protect participant confidentiality.

## **4. Results**

### **4.1. Sample Characteristics**

#### *4.1.1. Survey Respondents*

The quantitative sample consisted of 37 professionals working in intercultural, cross-functional consulting teams. All respondents reported involvement in projects related to organisational change, transformation, or cross-functional delivery.

Demographic data were limited to professional role and functional contribution in order to preserve participant anonymity within a single organisational context. Age, gender, and nationality were not collected.

Table 2 shows the distribution of respondents' primary area of contribution. Business Strategy and Change Enablement / Communication were the most frequently reported areas (n = 12 each). Operations / Process Improvement accounted for seven respondents, while Technology / Product Delivery and User Research / Design were less represented. One respondent selected "Other".

This distribution reflects the cross-functional nature of consulting work, in which strategic, operational, and change-oriented roles interact within shared project environments.

TABLE 2. DISTRIBUTION OF RESPONDENTS' PRIMARY AREA OF CONTRIBUTION

Area of Contribution	Frequency	Percentage
Business/Strategy	12	32%
Change Enablement/Communication	12	32%
Operations/Process Improvement	7	19%
Technology/Product Delivery	3	8%
User Research/ Design	2	5%
Other	1	3%

Source: own survey data

#### 4.1.2. Interview Participants

Four semi-structured interviews were conducted. Three participants worked in intercultural, cross-functional consulting teams at different levels of seniority, and one participant was an AI coach with professional experience advising organisations on AI-assisted collaboration.

Table 3 provides an overview of the interview participants and their professional context.

TABLE 3. INTERVIEW PARTICIPANTS

Participant	Role / Level	Professional Context
A	Consultant	Intercultural consulting teams
B	Manager	Cross-functional consulting projects
C	Senior Manager	Consulting leadership and delivery
D	AI Coach	AI-assisted tools in team settings

Source: own compilation

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## 4.2. Quantitative Results

### 4.2.1. Exploratory Factor Analysis

Exploratory factor analysis was conducted on eight items capturing emotionally intelligent behaviour in workplace interaction. A reverse-coded item reflecting functional barriers to collaboration was excluded prior to analysis, as it did not represent emotionally intelligent behaviour conceptually.

A principal component-based extraction identified a single dominant factor (eigenvalue = 3.53) accounting for 44.1% of the variance. All eight items loaded positively onto this factor, and no secondary interpretable dimensions emerged. Given the clear one-factor structure, emotional intelligence was operationalised as a single composite variable (EI\_mean), calculated as the mean of the retained items.

Internal consistency was acceptable (Cronbach's  $\alpha = 0.81$ ).

Cross-functional collaboration was measured separately using a single behavioural item and was retained as a distinct outcome variable.

### 4.2.2. Descriptive Statistics

EI\_mean had a mean score of 4.95 (SD = 0.78) on a seven-point scale, indicating generally high self-reported emotional intelligence. Cross-functional collaboration showed a mean of 5.62 (SD = 1.28), indicating frequent coordination across functional boundaries.

Both variables demonstrated sufficient variance and fell within expected scale ranges. Descriptive statistics are reported in Table 4.

TABLE 4. DESCRIPTIVE STATISTICS

Variable	Mean	SD
Emotional Intelligence	4.95	0.78
Cross-functional collaboration	5.62	1.28

Source: own compilation

### 4.2.3. Association Between Emotional Intelligence and Cross-Functional Collaboration

Pearson correlation analysis indicated a moderate positive association between self-reported emotional intelligence (EI\_mean) and self-reported cross-functional collaboration ( $r = .38$ ,  $p = .022$ ,  $N = 37$ ). Given the single organisational setting and limited sample size, this association is interpreted as context-specific rather than generalisable.

A simple linear regression with EI\_mean as the predictor and cross-functional collaboration as the outcome variable was statistically significant,  $F(1, 35) = 5.79$ ,  $p = .022$ , explaining 14% of the variance ( $R^2 = .14$ ). Self-reported emotional intelligence emerged as a statistically significant positive predictor ( $\beta = .38$ ,  $p = .022$ ). The regression results are presented in Table 5.

These findings confirm a statistically significant positive association between self-reported emotional intelligence and cross-functional collaboration. No causal inference is implied.

TABLE 5. LINEAR REGRESSION PREDICTING CROSS-FUNCTIONAL COLLABORATION FROM EMOTIONAL INTELLIGENCE

Predictor	$\beta$	p
Emotional Intelligence	0.38	.022

Note. N = 37. R<sup>2</sup> = .14.

Source: own compilation

### 4.3. Qualitative Findings

Three overarching themes emerged from the qualitative analysis. These themes relate to emotional self-regulation under pressure, empathy, hierarchy, and voice, and the perceived role of AI-assisted tools in communication preparation. Findings are illustrated through selected interview excerpts (Table 6).

TABLE 6. INTERVIEW EXCERPTS BY THEME

Theme	Interview Excerpt	Participant
Emotional self-regulation under pressure	“If someone senior gets visibly frustrated, the whole room changes. People stop talking, even if they have something useful to say.”	Consultant (A)
Emotional self-regulation under pressure	“In stressful situations, people look at how you react. If you stay calm, it gives the team permission to keep thinking instead of panicking.”	Senior Manager (C)
Empathy, hierarchy, and voice	“When seniors actively ask for input and really listen, juniors speak up more.”	Manager (B)
Empathy, hierarchy, and voice	“If feedback feels dismissive, you learn very quickly what not to say next time.”	Consultant (A)
AI-assisted tools and preparation	“People use AI to rehearse difficult messages or check tone before sending something sensitive.”	AI Coach (D)
AI-assisted tools and preparation	“It helps you pause before responding, but it doesn’t replace the conversation.”	Senior Manager (C)

Source: own interview data

Across themes, emotionally intelligent behaviour was experienced as shaping whether team interactions remained open and collaborative under pressure. Emotional self-regulation and empathy influenced participation across hierarchical and functional boundaries, while AI-assisted tools were described as supplementary supports for communication preparation rather than substitutes for human interaction.

## 5. Discussion

### 5.1. Interpreting Emotional Intelligence in Cross-Functional Collaboration

The quantitative results indicate a statistically significant positive correlation between self-reported emotional intelligence and self-reported cross-functional collaboration within the present sample. Higher self-reported emotional intelligence was associated with more frequent reported

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collaboration across functional boundaries. Given the sample size and single organisational setting, this finding is interpreted as exploratory and context-specific rather than generalisable.

This pattern is broadly consistent with prior research linking emotional intelligence to interpersonal effectiveness and collaborative performance in organisational settings (Carmeli, 2003; Melita Prati et al., 2003). In innovation-oriented consulting workplaces, collaboration is often shaped by intercultural communication norms, shifting client expectations, and rapid coordination across expertise domains. Within such contexts, self-reported emotional intelligence may function as a workplace competence that supports employability by enabling consultants to communicate constructively, manage interpersonal demands, and maintain coordination under time pressure (Faraj et al., 2018; Hajro et al., 2017).

Importantly, emotional intelligence is interpreted here as a workplace-relevant capability expressed through interactional practices rather than as a stable psychological trait. This interpretation aligns with conceptualisations locating emotional intelligence in everyday communication, emotion regulation, and social awareness (Goleman, 1998; Truninger et al., 2018). The effect size observed in this study suggests that emotional intelligence may operate as one enabling condition among several, alongside organisational structures, leadership practices, and project constraints.

Because the survey items were developed to reflect workplace-relevant expressions of emotional intelligence, the quantitative score should be understood as an indicator of perceived competence in emotionally intelligent workplace interaction. Within intercultural consulting environments, such competence may be particularly important for employability because it supports collaboration across different communication styles and role expectations.

## **5.2. Psychological Safety as an Interactional Outcome**

The qualitative findings suggest that psychological safety is experienced as emerging from everyday interaction rather than as a formally designed condition. Participants described emotionally intelligent behaviour, particularly emotional self-regulation and empathy, as shaping whether communication felt safe during moments of pressure or disagreement.

Remaining calm, moderating tone, and responding deliberately were described as preventing escalation and sustaining dialogue. These behaviours align with Edmondson's (1999) conceptualisation of psychological safety as a shared belief that interpersonal risk-taking does not lead to negative consequences. In consulting environments characterised by hierarchy and evaluative pressure, such interactional practices may be especially salient.

Empathy and perspective-taking appeared to support voice and participation in intercultural and cross-functional contexts. Acknowledging differing constraints reduced misattribution of intent and facilitated constructive engagement. This resonates with research on diverse teams, where empathy supports inclusive participation and learning behaviour (Nembhard & Edmondson, 2006). Psychological safety in this context was not associated with the absence of disagreement, but with the ability to navigate disagreement without fear of exclusion.

## **5.3. Emotionally Intelligent Practices in Hierarchical and Intercultural Contexts**

In hierarchical settings, emotionally intelligent practices among senior team members appeared particularly influential. Emotional reactions from leaders were described as shaping the tone of team interaction and influencing the broader emotional climate. Inviting input and

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acknowledging uncertainty were perceived as reducing perceived power distance and supporting participation from junior members. These observations are consistent with leadership research linking inclusive behaviours to voice and engagement (George, 2000), particularly in professional service and consulting contexts.

In intercultural teams, emotionally intelligent practices appeared to facilitate coordination by supporting interpretation of emotional cues across differing communication norms. Rather than eliminating cultural differences, such practices may enable teams to manage them more constructively through adaptive interaction.

#### 5.4. AI-Assisted Tools as Contextual Influences

Although AI-assisted tools were not a central focus of the practitioner interviews, digital communication tools such as drafting and tone-adjustment systems were referenced in relation to workplace communication practices. These references suggested that such tools may support preparation and clarity, particularly in high-pressure or cross-functional contexts.

More extensive reflection on AI-mediated communication emerged in the specialist interview. The expert emphasised that the developmental value of AI systems depends on their capacity to balance support, challenge, and reflection. Systems that primarily reinforce user assumptions may risk over-supporting behaviour while limiting opportunities for critical reflection. In contrast, tools that prompt perspective-taking or encourage reconsideration may scaffold emotionally intelligent interaction when used deliberately.

Within this organisational setting, psychological safety appeared to remain grounded in human interaction rather than technological augmentation. AI-assisted tools functioned as contextual supports embedded within existing communication norms rather than as independent drivers of relational trust.

These findings suggest that the impact of AI in consulting workplaces is shaped less by technological capability alone and more by how such tools are integrated into emotionally intelligent and psychologically safe interactional cultures.

## 6. Conclusion and Implications

This study examined how self-reported emotionally intelligent behaviour relates to cross-functional collaboration and experienced psychological safety within a single intercultural consulting context, while considering the contextual role of AI-assisted tools. By combining quantitative survey data with qualitative interview insights, the study provides applied insight into how emotional, relational, and digital practices may interact in contemporary consulting work, particularly in relation to employability and early-career skill development.

The quantitative findings indicate a statistically significant, moderate positive **correlation** between self-reported emotionally intelligent behaviour and self-reported cross-functional collaboration ( $r = .38, p = .022$ ), with emotional intelligence explaining 14% of the variance in reported collaboration. Within this sample, emotionally intelligent behaviour may function as one enabling condition for collaboration rather than as a sole determinant, supporting coordination in complex project environments.

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Qualitative findings complement this result by illustrating how psychological safety was described as emerging through everyday interaction. Participants reported that emotional self-regulation, empathy, and adaptive communication shaped whether individuals felt able to speak up and engage constructively under pressure. Psychological safety was described by participants as developing through repeated interpersonal exchanges rather than through formal structures alone.

With regard to AI-assisted tools, findings suggest an indirect and context-dependent role. AI-supported drafting and communication preparation were described as helpful for reflection and emotional regulation, particularly in sensitive interactions. However, psychological safety remained grounded in human judgement, trust, and emotional conduct, with AI tools acting as supplementary supports rather than substitutes for emotionally intelligent behaviour.

### **6.1. Practical Implications**

For organisations operating in consulting and knowledge-intensive environments, the findings suggest that collaboration and psychological safety are unlikely to be achieved through digital tools or formal processes alone. Supporting emotional self-regulation, empathy, and adaptive communication may contribute to collaboration in intercultural and cross-functional teams. Training, coaching, and reflective learning practices could help embed these capabilities in everyday work.

For early-career professionals, self-reported emotionally intelligent behaviour appears associated with participation and collaboration in digitally mediated environments. As AI-assisted tools become more prevalent, professional effectiveness may increasingly depend on integrating emotional, relational, and technological capabilities in a reflective and responsible manner.

### **6.2. Limitations and Future Research**

This study is subject to limitations, including a relatively small and context-specific quantitative sample and a cross-sectional design that does not permit causal inference. Both emotional intelligence and cross-functional collaboration were measured using self-reported survey items, and collaboration was captured through a single-item measure. Insights into AI-assisted tools were informed primarily by expert and senior perspectives, limiting representativeness across career stages.

The study also reflects certain underlying assumptions. It assumes that self-reported emotionally intelligent behaviour provides a reasonable approximation of how such behaviour is enacted in practice, and that reported frequency of cross-functional collaboration captures meaningful aspects of collaborative work. These assumptions influenced the study's measurement choices and interpretation. In addition, the focus on a consulting population reflects the expectation that emotionally intelligent behaviour is particularly relevant in high-pressure, cross-functional environments, which may limit transferability to other occupational contexts.

Future research could also examine whether emotionally intelligent behaviour develops differently across career stages, and whether AI-assisted tools moderate the relationship between emotional regulation and psychological safety in digitally mediated teams.

Overall, the study highlights the continued relevance of emotionally intelligent behaviour in shaping collaboration and psychological safety within the examined consulting context. While AI-assisted tools may support communication practices, their influence appears dependent on

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how emotional and relational skills are enacted in everyday work, reinforcing employability as a primarily human capability in digitally mediated environments.

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## **Appendix A**

### **Survey Instrument**

Participants completed an anonymous online survey. Unless otherwise specified, items were rated on a seven-point Likert scale:

1 = Strongly disagree

7 = Strongly agree

### **Emotional Intelligence Items (Exploratory Scale)**

Participants indicated their agreement with the following statements:

The project team I worked with adapted communication based on emotional tone or team dynamics.

I remained emotionally composed and focused when the project became stressful.

Team members were aware of how their behaviour or mood affected others during the change project.

Project routines (e.g., planning, reviews, syncs) included input from diverse functional stakeholders.

I felt confident bridging communication gaps between technical, business, and strategy stakeholders during the project.

Leaders involved in the change initiative made a conscious effort to connect emotionally with the team.

Emotional resistance to change was addressed through empathy and open dialogue.

Team members actively supported one another when someone faced personal or work-related challenges.

An overall emotional intelligence score was calculated as the mean of these eight items following exploratory factor analysis (see Section 3.2.1).

### **Cross-Functional Collaboration Item (Exploratory Scale)**

Participants responded to the following item:

I regularly collaborated with colleagues from different functions (e.g., tech, design, operations, product) on the change project.

### **Reverse-Worded Item (Excluded from Factor Analysis) (Exploratory Scale)**

Differences in language, priorities, or goals between functions made collaboration more difficult.

(This item was reverse-coded and excluded from the emotional intelligence factor as described in Section 3.2.1.)

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## Appendix B

### Semi-Structured Interview Guide

Semi-structured interviews were conducted to contextualise the quantitative findings and to explore how emotional intelligence is enacted in cross-functional collaboration and AI-mediated workplace communication. Two interview streams were conducted: (1) practitioner interviews with consulting professionals and (2) a specialist interview with an AI coaching expert.

#### Part A: Practitioner Interviews (Consulting Professionals)

Three semi-structured interviews were conducted with consulting professionals across different levels of seniority within intercultural consulting teams. Interviews explored emotional intelligence as a workplace competence, cross-functional collaboration, psychological safety, and AI-mediated communication practices.

#### Workplace Context and Interactional Demands

*Participants were invited to reflect on:*

- a) Key challenges encountered in digital or innovation-driven initiatives
- b) Experiences of cross-functional coordination under time pressure
- c) Examples of difficult collaboration situations
- d) Routines or practices used to align stakeholders across teams

These prompts served to situate participants within their organisational context before exploring interactional dynamics in greater depth.

#### Cross-Functional Collaboration and Communication

*Participants were asked to describe:*

- a) Factors that helped or hindered communication between technical, business, and strategy roles
- b) Communication breakdowns or misunderstandings across functions
- c) The influence of terminology, expertise level, hierarchy, or cultural background on collaboration
- d) Communication formats or routines that supported alignment

Probing questions explored how participants navigated differences in goals, language, and professional background.

#### Emotional Intelligence and Psychological Safety

- a) How does emotional regulation influence collaboration during high-pressure situations?
- b) In what ways does empathy or perspective-taking affect cross-functional teamwork?
- c) How do leaders' emotional responses influence team climate or participation?

- 
- d) What makes team members feel willing or unwilling to speak up?
  - e) How is disagreement navigated constructively within teams?

These prompts were used to explore emotional intelligence as enacted practice rather than as an abstract trait.

### **AI-Assisted Communication Practices**

*Participants were invited to discuss:*

- a) How AI-assisted tools were used in daily workplace communication
- b) Situations in which AI tools supported clarity, preparation, or alignment
- c) Situations in which AI tools were perceived as insufficient or potentially limiting
- d) Whether AI tools influenced participation, reflection, or confidence in communication

Discussion of AI typically emerged in relation to concrete project examples rather than as abstract evaluation.

### **Part B: Specialist Interview – AI Coaching Expert**

A separate semi-structured interview was conducted with an AI coaching specialist to explore the developmental implications of AI-mediated communication.

*The expert interview was guided by prompts relating to:*

- a) Features of AI-assisted tools that enhance or reduce communication clarity in diverse teams
- b) The role of support, challenge, and reflection in AI-mediated interaction
- c) How AI systems may influence emotional and social competencies
- d) Potential effects of AI tools on voice, accountability, and participation among early-career or lower-status professionals

This interview provided socio-technical and developmental perspectives complementing practitioner accounts.

### **Declaration Statements**

#### **Conflict of Interest**

The authors report no conflict of interest.

#### **Funding**

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#### **Data Availability**

Data supporting the findings of this study can be made available upon reasonable request from the corresponding author.

#### **AI Use**

AI-based tools were not used for data collection, analysis, or interpretation. Limited use of AI-assisted tools was restricted to language editing and formatting support during manuscript preparation. The

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author affirms that all cited sources are real, accurately referenced, and have been verified. Full responsibility for the content and integrity of this article remains with the author.

### **Ethics Statement**

Participation in the survey and interviews was voluntary and based on informed consent. All responses were collected anonymously, and no personally identifiable information was recorded. Participants were informed about the purpose of the study and their right to withdraw at any time. The study complied with standard ethical guidelines for social science research.

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# GILE Journal of Skills Development

## Factors Influencing Entrepreneurship Curriculum and Pedagogy Towards the Development of Graduate Entrepreneurs in South Africa Higher Education

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### Abstract

South Africa continues to face persistently high levels of graduate unemployment, which restricts economic productivity and further intensifies poverty, inequality, and the marginalisation of young people. In response, the development of graduate entrepreneurs has become a strategic national priority, as entrepreneurial skills are increasingly viewed as a pathway to job creation, innovation and inclusive economic growth. Higher education institutions are, therefore, crucial in equipping graduates with the entrepreneurial abilities required to pursue self-employment and venture creation. To understand the reasons for low entrepreneurial intention, this study examines curriculum and pedagogical factors that shape entrepreneurial intentions among university students in South Africa, using a qualitative research design. Findings reveal that entrepreneurship education remains predominantly theoretical, with critical gaps including a lack of early exposure, limited practical learning, misaligned curriculum and pedagogy, poor integration with non-business programmes, systemic constraints, and insufficiently skilled lecturers. The study argues that without meaningful curriculum reform and pedagogical innovation, entrepreneurship education cannot effectively develop graduate entrepreneurs. Recommendations include adopting experiential and problem-based teaching strategies, strengthening industry partnerships, enhancing lecturer capacity and integrating entrepreneurship across all disciplines. These insights inform policy and practice to transform entrepreneurship education into a more effective catalyst for graduate entrepreneurs and ultimately, contribute to South Africa's socio-economic development.

**Keywords:** curriculum, pedagogy, entrepreneurship education, graduate, entrepreneurial intention

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## 1. Introduction

Delivering productive entrepreneurship education to motivate graduates for entrepreneurial uptake is influenced by the structure of the curriculum and pedagogy (Iwu, 2022). The structure of the curriculum and pedagogical strategy are significant in stimulating the development of graduate entrepreneurs who will engage in venture creation, as indicated by several researchers (Ajani, 2024; Hoffman, 2020; Iwu et al., 2020). However, designing and implementing an entrepreneurship curriculum that successfully promotes practical, skill-based, and experiential learning remains a complex challenge, particularly within the South African context, where universities face the urgent task of empowering graduates with entrepreneurial mindsets to address persistent unemployment and drive inclusive economic development (Makwara et al., 2024; Mayombe, 2024; Motaung, 2024).

With an official employment rate of 31.9% and a youth unemployment rate of 46.1% recorded in the 2025 Q3 unemployment statistics report, South Africa remains one of the countries with a high unemployment rate (Statistics South Africa, 2025). The report further indicated that unemployment among university graduates has increased to 10.4%, up from 8.7% in 2024, particularly affecting youth graduates aged 15-34 (Stat SA, 2025). This underscores the urgency of developing graduates with an entrepreneurial mindset, given the economy's struggle to absorb the upcoming graduates in the labour market. With traditional employment not readily available, entrepreneurship education is emerging as an alternative that provides graduates with a means of generating their own economic opportunities (Ajani, 2024; Gabrueksson et al., 2020). While Iwu (2022) has noted an increased focus on developing entrepreneurial skills, a considerable number of entrepreneurial initiatives have been launched to support university students in entrepreneurial engagement. These include the Entrepreneurship Development in Higher Education (EDHE), SARCHi Chairs, UNESCO Chairs, institution-funded initiatives, and SETA-funded programmes. Despite several initiatives to support entrepreneurial activities, students' entrepreneurial engagement remains minimal.

Entrepreneurship curriculum and pedagogy encompass both the content and delivery mechanisms that equip graduates with innovative thinking and self-reliance, essential for employment creation and venture development (Iwara, 2025; Rodrigues, 2023). As hinted *a priori*, despite their central role in shaping entrepreneurial learning, persistent challenges remain that, in a way, impede alignment towards the development of graduate entrepreneurs (Nabi et al., 2017). A growing body of literature indicates that current curriculum structures and pedagogical approaches often fail to produce graduates who successfully transition into entrepreneurial ventures (Cui et al., 2021; Hoffman, 2020; Iwu, 2022; Makwara et al., 2024). Tewari and Ilesanmi (2020) highlighted that the impact of entrepreneurship curriculum and pedagogy on venture creation remains limited and fails to stimulate entrepreneurial intention among graduates.

Given the significant impact of an entrepreneurship curriculum and pedagogy, as well as the shortfall identified in the extant literature, establishing their relevance for empowering entrepreneurial ambitions among graduates is paramount (Lee, 2020; Rankhumise et al., 2020). This need is particularly urgent in South Africa and across the continent, where graduate unemployment remains high and pathways for economic participation remain limited. Consequently, the development of a well-structured entrepreneurship curriculum and pedagogical framework is crucial in producing graduate entrepreneurs who will make meaningful contributions to national and global development plans, including the South African

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National Development Plan (NDP) 2030, the African Union's Agenda 2063, and the United Nations (UN)'s Sustainable Development Goals (SDGs). To that end, this study examines how effectively entrepreneurship course content and delivery applications influence graduates' preparedness to become successful venture creators in South Africa.

## **2. Review of Related Literature**

Entrepreneurship education has been lauded as one of the powerful drivers of effective learning, offering a creative-oriented learning experience that instils graduates with entrepreneurial knowledge, skills, and competencies (Taleb et al., 2023). A well-structured curriculum and pedagogy are determinants of this outcome (Iwu et al., 2018). The efficacy of well-structured entrepreneurship education and teaching has been highlighted by Hadley (2025) and Neergaard and Christensen (2017) to provide comprehensive learning experiences that shape the development of an entrepreneurial mindset and prepare graduates to create businesses that generate employment and reduce unemployment. Consequently, Murray (2024) emphasised that an effective, strategically oriented entrepreneurship curriculum and pedagogy are influenced by integrating early exposure to entrepreneurship, practical learning, alignment of delivery methods, inclusivity of non-business programmes, system structure, and knowledgeable lecturers into their learning components.

### **2.1. Barriers to Effective Entrepreneurship Curriculum and Pedagogy**

While various factors have been recognised as contributing to the lack of effectiveness of entrepreneurship curriculum and pedagogy, such as early exposure to entrepreneurship, practical learning, delivery methods alignment, non-business programme inclusivity, system structure and practical lecturers, scholars of entrepreneurship have identified these factors as instrumental to robust learning (Iwu et al., 2021; Lee, 2020). Lack of structuring these factors, perhaps impeding graduates' motivation to pursue entrepreneurship and thereby affecting the development of practical entrepreneurs in South Africa (Murray, 2024).

Early exposure to entrepreneurship has been identified as fostering entrepreneurial ambition among graduates, which is imperative. Ndofirepi and Steyn (2023) and Boldureanu et al. (2020) argue that early entrepreneurship education programmes provide students with the passion, confidence, and skills to start their own businesses and overcome inevitable challenges. Sezen-Gultekin and Gur-Erdogan (2016) maintained that early entrepreneurial education boosts graduates' confidence, competence and talent. Furthermore, these authors claim that early exposure to entrepreneurship education among students fosters a deeper understanding of the concept and equips them with the ability to apply initiatives that lead to venture creation. Additionally, Paek et al. (2021) contend that the timing of exposure to entrepreneurial learning significantly influences educational outcomes. However, Mothibi and Malebana (2025) highlights that the lack of early involvement in entrepreneurship learning hinders entrepreneurial intention among graduates. Similarly, Qwabe et al. (2025) observed the absence of early exposure to entrepreneurship education across various South African Universities, thereby hindering entrepreneurial interest, preventing the capitalisation of opportunities, and leading to reliance on formal employment.

An effective entrepreneurship education depends on its practical nature, equipping students with real-world skills and promoting innovative thinking (Haneberg et al., 2022). While practical-based learning is paramount in facilitating participatory learning that integrates case and project studies,

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internships, and mentorship, ensuring learners actively participate in real-life tasks rather than studying theory (Bell & Bell, 2020). However, Nabi et al. (2017) identify the inadequate acquisition of practical skills and knowledge within the higher education (HE) ecosystem as a significant barrier to producing competent graduate entrepreneurs. Notably, Iwu (2022) revealed that the absence of practical learning integrated in the delivery of entrepreneurship curriculum in South Africa makes it difficult to produce graduate entrepreneurs.

Without aligning the curriculum and teaching methods, producing graduates with an entrepreneurial intent to curb unemployment becomes nearly impossible as they are ill-prepared (Hägg, 2017). The alignment of curriculum and pedagogical approaches is important in offering and promoting a holistic learning experience as it empowers graduates to understand education about, for, and through (Lackéus, 2020; Nabi et al., 2017; Olutuase et al., 2023). However, Nabi et al. (2017) highlight that the lack of alignment between the entrepreneurship curriculum and teaching methods impedes entrepreneurial activities and engagement among graduates. Notably, Vorvornator and Midiniso (2025) and Qwabe et al. (2025) highlighted a persistent misalignment within entrepreneurship education across South African HEIs, emphasising that it lacks essential experiential components such as mentoring, work-integrated learning, and access to entrepreneurial hubs. Dzomonda and Fatoki (2019) share a similar view, stating that academic entrepreneurship courses lack practical knowledge despite graduates gain extensive academic knowledge but little hands-on experience. Therefore, theoretical learning alone restricts students' business potential after graduation (Decker-Lange et al., 2021).

The non-business programme's inclusivity is another essential factor influencing graduates' entrepreneurial uptake (Sirelkhatim & Gangi, 2015). Embedding entrepreneurship education across diverse academic disciplines has emerged as a catalytic force, encouraging graduates from non-business fields to engage with entrepreneurial thinking and practice (Hadley, 2023). Furthermore, the involvement of non-business disciplines such as science, technology, engineering, and mathematics (STEM) advances an entrepreneurial mindset among graduates, thereby supporting job creation and innovation (Ozyazici et al., 2025). However, empirical research indicates that the lack of inclusivity in the entrepreneurship curriculum across all academic levels and institutions constrains the development of an entrepreneurial culture, particularly among students enrolled in non-business programmes (Ozyazici et al., 2025; Vorvornator & Midiniso, 2025). Consequently, Iwu et al. (2020) argue that despite being incorporated into university curricula, entrepreneurship education has not yielded a meaningful impact on graduate development. For example, a study by Tengeh et al. (2015) found that although entrepreneurship was incorporated into non-business disciplines at South African Universities of Technology (UoTs), only 15 out of the 46 programmes reported that approximately 33% offered active entrepreneurship learning.

Furthermore, within the system structure of entrepreneurship curriculum, the framework for teaching and learning is crucial (Jones et al., 2018). Equally, the institutional structure comprises culture, mechanisms, and resources that empower the learning of entrepreneurship education (Shirokova et al., 2016). These institutional structures drive entrepreneurship education as a field of study and promote its embedding in non-business programmes (Kuratko & Morris, 2018). For instance, some structures, cultures, and mechanisms that propel entrepreneurial learning include curriculum, effective pedagogical approaches, and the use of educators with expertise in entrepreneurial experience to teach entrepreneurship education (Shirokova et al., 2016). However,

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the absence of a systematic structure that aligns with entrepreneurship education is an influential factor hindering effective learning in entrepreneurship (Iwu & Opute, 2021). In South Africa, Mahadea and Kabange (2024) and Mahadea and Kaseeram (2018) argue that entrepreneurship teaching lacks a systemic structure as entrepreneurship is offered as a module rather than a field of study, lacks integration with non-business programmes, and is predominantly theoretical. Hence, graduates tend not to become venture creators that will curb unemployment.

Additionally, engaging experienced lecturers with an entrepreneurial speciality to teach entrepreneurship education is paramount (Vorvornator & Midiniso, 2025). The effectiveness of any teaching depends on the educators' skills and competencies, which empower them to master the technicalities of conveying knowledge (Latip et al., 2020). Educators are a significant element to consider in entrepreneurship education because they play a pivotal role in developing and instilling knowledge that stirs up entrepreneurial spirit and behaviour among graduates (Lackéus, 2020). Several schools of thought, such as Nabi et al. (2017) and Iwu (2022), have debated the competence of entrepreneurship educators in South Africa as a significant challenge to the development of graduate entrepreneurs. Iwu et al. (2021) reported that the lack of knowledgeable and skilled lecturers who inspire and motivate students towards entrepreneurship is one of the key factors hindering student entrepreneurial intention in South Africa.

## **2.2. The Influence of the Curriculum and Pedagogy on Stimulating Graduate Entrepreneurs**

The essence of a well-structured curriculum and pedagogy is to influence graduates' motivation and foster effective entrepreneurial learning (Roy et al., 2020). It promotes lifelong learning by equipping graduates with the entrepreneurial mindset, skills, competencies, and knowledge necessary to take initiative (Baggen et al., 2022).

In motivating graduates to pursue entrepreneurship, early structuring of entrepreneurship education into the curriculum to provide students with exposure is paramount. When considering graduate entrepreneurial acquisition, Olutuase et al. (2023) note that early exposure to entrepreneurship will enable students to develop an entrepreneurial mindset before they specialise in their field. Nzembayie et al. (2024) and Branca et al. (2025) emphasise that early involvement in entrepreneurship provides an explicit articulation of pedagogical delivery methods that effectively engage learners. Equally, early exposure to entrepreneurship influences career choices as students are encouraged to view it as a viable and rewarding path (Lee, 2020; Olutuase et al., 2023). Importantly, these elements collectively shape the perceived attractiveness of entrepreneurship education, contingent on both the curriculum content and its delivery mechanisms among the graduates (Hunter & Lean, 2018).

While practical-based learning is essential, it promotes experiential, interactive learning that helps students develop an entrepreneurial spirit and mindset (Lackéus, 2020). Notably, this type of learning engagement involves classroom time, hands-on learning and soft skills that encourage learners (Awaah et al., 2023). Consequently, practical-based learning promotes lifelong learning that emphasises innovation and the development of creative skills, thereby stimulating learners' entrepreneurial intentions (Awaah et al., 2023; Gan et al., 2022). In order to promote graduates' venture-creation capacity, a well-structured curriculum and pedagogical framework that integrates practical, soft-skill, and theoretical skill development is needed (Gryazeva-Dobshinskaya et al., 2020). Lee (2020) contends that entrepreneurship-focused

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pedagogy, particularly when designed to incorporate experiential and action-based learning, stimulates the development of an entrepreneurial mindset, core competencies, and applied skills. Accordingly, the following forms of knowledge are considered fundamental for effectively engaging graduates in entrepreneurship education.

The alignment of the curriculum and delivery approach is one of the most influential factors in developing graduate entrepreneurs in South Africa (Iwu, 2022). The importance of alignment is to create a comprehensive learning experience that is tailored towards empowering students with an entrepreneurial mindset and intention (Nzembayie et al., 2025). Notably, Decker-Lange et al. (2021) emphasise that a well-designed entrepreneurship curriculum and pedagogy define clear learning outcomes and adopt an effective teaching approach that is tailored to graduates' developmental needs, while simultaneously providing opportunities for them to explore and cultivate their talents. It is worth noting that the curriculum and pedagogy framework sparks students' interest and increases graduate engagement (Lee, 2020). Hence, a structured entrepreneurship education programme makes students more likely to become entrepreneurial and start their own enterprises (Mukhtar et al., 2021).

The non-business programme's inclusivity is an important factor that helps students from other disciplines develop entrepreneurial interest. The integration of entrepreneurship education across diverse academic disciplines has emerged as a catalytic force, encouraging graduates from non-business fields to engage with entrepreneurial thinking and practice (Hadley, 2023). However, a persistent misconception that entrepreneurship education is exclusively intended for students in business-related programmes remains (Awaah et al., 2023). The importance of inclusivity in non-business programmes in entrepreneurship education is to ensure that, regardless of their field of study, the venture-creation potential is identified and nurtured (Iwu, 2022). As such, this interdisciplinary approach advances entrepreneurial thinking and start-up orientation among graduates, making them more dynamic in the job market (Jones & Jones, 2014; Jones, 2019). Jones et al. (2018) further argue that embedding an entrepreneurship curriculum across various academic domains is essential, helping non-business graduates to create their own employment opportunities rather than relying on traditional career pathways.

Building a solid systemic structure framework is a significant factor in producing effective entrepreneurial learning and developing graduate entrepreneurs (Mahadea & Kaseeram, 2018). The role of the system structure is to ensure that the curriculum framework is designed to offer itself as a stand-alone discipline and to be integrated into interdisciplinary studies (Mahadea & Kabange, 2024). Consequently, an effective systemic structure promotes a pedagogical framework that aligns the three teaching components: theoretical, practical, and soft-skills learning (Olutuase et al., 2023). Further, ensure that knowledgeable lecturers, who are experts in the field of entrepreneurship education, are used to deliver instruction that instils entrepreneurial spirit and intention (Kuratko & Morris, 2018). Hence, a system that ensures that entrepreneurship curriculum and pedagogy provide a step-by-step roadmap that leads to venture creation, reducing unemployment and impacting economic growth (Mukhtar et al., 2021).

Designing a meticulous entrepreneurship curriculum and pedagogical framework demands the engagement of knowledgeable lecturers with deep expertise in entrepreneurship education (Matlay, 2018). Consequently, Ncube (2022) states that developing graduate entrepreneurs in South Africa is imperative and requires a range of highly specialised skills and knowledge. Similarly, Cui et al. (2019) emphasised the importance of engaging educators who are knowledgeable and skilled in

business and management, equipped with entrepreneurship knowledge, and are business owners. Thus, engaging such practitioners would enhance the relevance and appeal of entrepreneurship education, particularly for graduates aspiring to pursue entrepreneurial careers in South Africa.

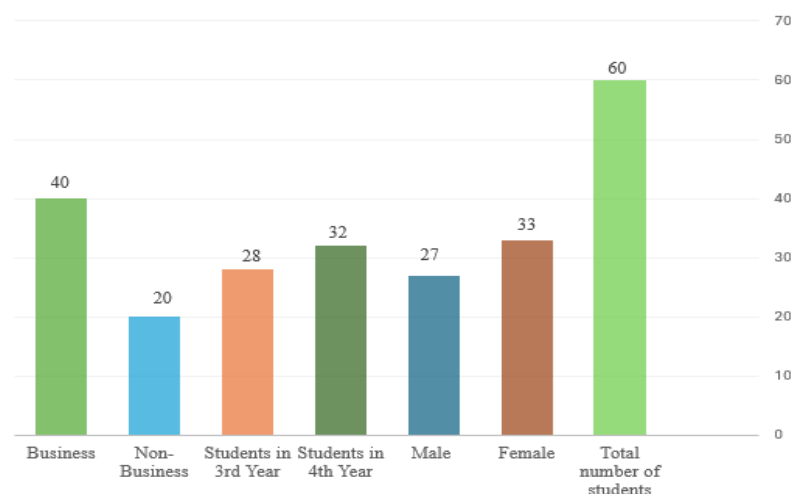
### 3. Methodology Framework

The study employed a qualitative research design involving two universities located in Cape Town, Western Cape, South Africa. Basically, data collection was conducted through focus group conversations using open-ended interview questions. To engage in the discussion, 60 participants were selected and organised into 12 groups, each comprising five students. While the study auto-recorded all sessions, transcription and data analysis were performed using ATLAS.ti software to ensure systematic coding and thematic were accurately interpreted. To avoid the clashing of academic lectures and scheduled interviews, the researchers carefully considered to accommodate all participants' academic commitments. To explore the emerging patterns and perspectives, the interpretivism paradigm and inductive approach were adopted (Khatri, 2020). Furthermore, an exploratory design was utilised to investigate how the curriculum and pedagogical frameworks influence entrepreneurial interest and intention among graduates to take entrepreneurship as a viable career option (Majid, 2018). Additionally, to achieve a robust contextual understanding and deepen analytical insights, case study techniques were the best option suited for the study (Maxwell, 2021).

#### 3.1. Sample

The study population consisted of 60 students designated from two universities in Cape Town, situated in Western Cape Province, South Africa. The participants in this study were chosen based on specific criteria to ensure diversity and relevance. The sample inclusivity were students who had been exposed to entrepreneurship learning and those who had not. The participants accepted in these discussions were students in their third and fourth academic years, as they were expected to have sufficient academic maturity to provide meaningful insights into the topic under investigation. The population size was intentionally designed to generate rich perspectives on the factors that influence the alignment of curriculum and pedagogy, thereby stimulating graduates' entrepreneurial intention. Note that the 60 participants were organised into 12 groups, each consisting of five students, to ensure high-quality data collection, as shown in Figure 1.

FIGURE 1. STUDENTS' CLASSIFICATION



Source: analysed data by the authors

### 3.2. Research Authorisation

Ethical authorisation of this study was granted by the Research Ethics Committee of the University of the Western Cape, South Africa (UWC). Adherence to ethical principles to ensure the protection of participants' rights, such as safety, privacy, anonymity, confidentiality, informed consent, and voluntary participation, while avoiding deception and maintaining fairness. In accordance with these regulations, all participants signed an informed consent form before participating in the study.

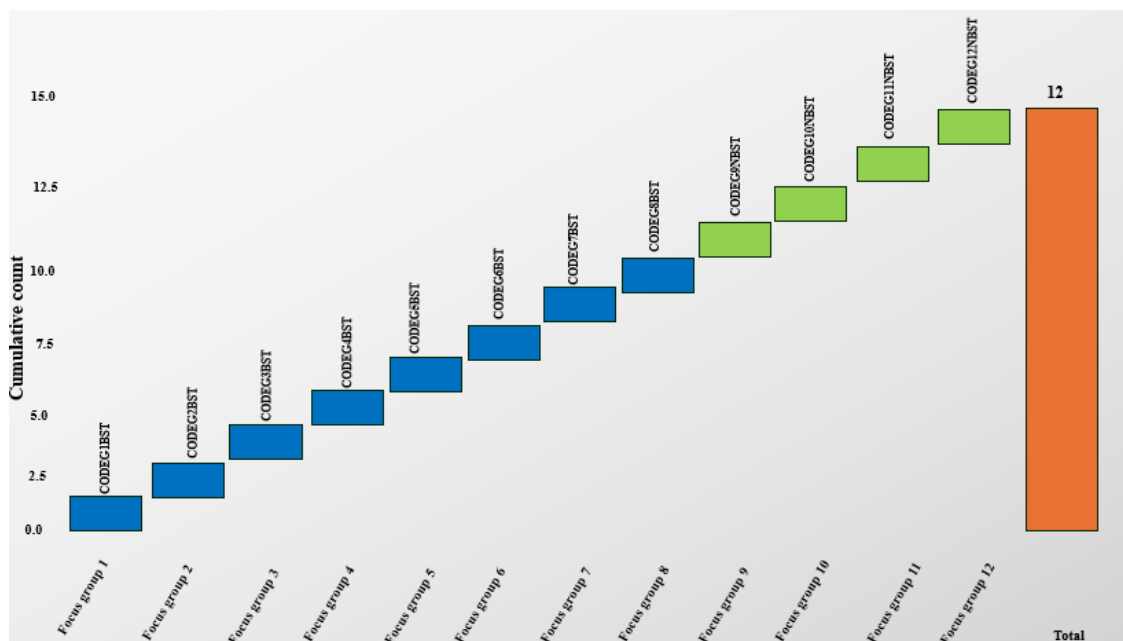
## 4. Empirical Findings and Evaluation

The purpose of this study was to examine how the curriculum and pedagogical framework employed in entrepreneurship education in South Africa are used to engineer the alignment of graduate entrepreneurial development. The following section provides analysis based on insights drawn from transcribed interview data.

### 4.1. Presentation of Codes

For the purpose of clarity and uniformity in code identification, each group was assigned a distinct identifier. The code framework was structured to distinguish participants enrolled in business-related programmes from non-business-related disciplines. Specifically, codes CODEG1-8BST correspond to business-related students, whereas CODEG9-12NBST represents non-business students. This categorisation supports systematic analysis and is visually depicted in Figure 2.

FIGURE 2. PRE-GROUP WATERFALL WITH CODES



Source: analysed data by the authors

### 4.2. Findings

#### 4.2.1. Early Learning Exposure

The initial stage at which entrepreneurship education is delivered to graduates plays a crucial role in reshaping the overall exposure to entrepreneurial learning. This foundational level

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significantly influences how well-prepared and motivated graduates will be as they embark on the entrepreneurial journey. Most respondents (9 of the 12 participants, representing 75%) reported enrolling in entrepreneurship education during their undergraduate studies, specifically in their second and third years while 25% of the participants reported never having had any entrepreneurial learning experience. Hence, this lack of early introduction to entrepreneurship learning affects graduates' entrepreneurial intentions. To confirm the effect on entrepreneurial intention, the participants shared their views:

*“According to the majority of participants in this group, their first exposure to entrepreneurship education occurred only in their second or third year of study.”* (Focus Group 3/CODEG3BST – 3 out of 5 participants)

*“In our second year, we were introduced to entrepreneurship education as an elective module, designed and structured within the Introduction to Economics and Business course and offered for only one semester.”* (Focus Group 5/CODEG5BST – participants 2 & 4)

*“We were exposed to entrepreneurship learning during our second and third years of study.”* (Focus Group 6/CODEG6BST – all participants chorused on this)

In contrast to the above responses from business graduates, non-business programme graduates sadly shared the view that they had not had the opportunity to study entrepreneurship, with the exception of two participants.

*Several participants shared similar experiences, with two noting, “We were not exposed to entrepreneurship education at any stage during our academic programme.”* (Focus Group 11/CODEG11BST – 2 participants)

*One participant shared, “We only started learning about entrepreneurship in our second year”* (Focus Group 10/CODEG10NBST, participant 3). *Another participant added, “For me, it only came in the third year.”* (Focus Group 10/CODEG10NBST, participant 4)

The absence of early exposure to entrepreneurship learning among graduates has a profound impact on their intentions to engage in entrepreneurial activities. These critical gaps highlighted the importance of introducing entrepreneurial concepts at the formative stages of learning. The research conducted by Iwu (2022) and Mothibi and Malebana (2025) supports the finding that neglecting to incorporate entrepreneurship education into the curriculum, which offers fundamental elements early in the students' academic journeys, hinders their entrepreneurial appetite. As a result, many potential entrepreneurs are deprived of essential skills, knowledge and mindset necessary to inspire innovative thinking and business creation. Failing to cultivate an interest in and understanding of entrepreneurship from the outset impedes the development of a proactive entrepreneurial culture among graduates.

#### 4.2.2. Practical Learning

In entrepreneurship education curriculum and pedagogy, practical learning is characterised by its ability to engage graduates actively in the entrepreneurial learning experience to complement theoretical learning. This promotes dynamic learning that captivates graduates' interest and ignites their passion for practical, hands-on experiences. However, all participants unanimously

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stated that their entrepreneurial learning lacked experiential guidance on application, which helped graduates explore best practices and develop skills to drive entrepreneurial success in the complex business world. Below are some of the respondents' views:

*“The entrepreneurship learning we were exposed to lacked experiential engagement and excitement. This learning primarily relied on textbook knowledge, which denied us the opportunity to apply practical knowledge that inspires creativity.”* (Focus Group 2/CODEG2BST, participants 1, 3 & 4)

*“The entrepreneurship learning that instils graduates with confidence, lacks practical application and impedes their desire among graduates to become entrepreneurs, is not integrated in our entrepreneurship education curriculum and pedagogy.”* (Focus Group 3/CODEG3BST, all participants)

*“We do not believe that entrepreneurship learning has been effective in empowering graduates to pursue entrepreneurship as a career so far, because the delivery method has several limitations, including a lack of practical exercises that offer project management, business plan development, and pitching of business ideas for the upward process. All these limit our interest.”* (Focus Group 4/CODEG4BST, participants 1, 3 & 5).

Additionally, non-business programme graduates shared their views as follows:

*“The current approach to entrepreneurship learning delivery for graduates falls short of delivering an enriched learning experience that inspires us to pursue entrepreneurial ventures. We were only offered a basic understanding of entrepreneurship, which does not provide us with the detailed knowledge and skills necessary.”* (Focus Group 10/CODEG10NBST, all participants)

Within the entrepreneurship education curriculum and pedagogy, the analysis has revealed that experiential learning, an aspect of learning that provides lifelong benefits and complements the theoretical approach, is inadequate, supporting the findings of Cui et al. (2021), Mizaur (2020), and Vorvornator and Midiniso (2025). This analysis of the ineffectiveness of entrepreneurship learning in offering practical guidance hinders aspiring graduates from becoming venture creators. Hence, this ineffective learning significantly hinders the growth and development of graduates who pursue entrepreneurship as a viable career option.

#### 4.2.3. Delivery Method Alignment

The pedagogical style is an essential element to consider when designing an entrepreneurship curriculum as it advances strategies and techniques that facilitate the development of innovative skills, knowledge, and mindset. The majority of the participants (83%) affirmed that teaching delivery lacks practical applications alignment, which impedes graduates' engagement in innovative, interactive learning that inspires entrepreneurial intention. While the remaining 17% had no clue about the delivery method of entrepreneurship education. Hence, the teaching is not in alignment with the above. Below are the participants' responses.

*“..... A curriculum pedagogy that is overloaded with theories can be a turn-off for graduates who aspire to become entrepreneurs.”* (Focus Group 4/CODEG4BST, echoed by all participants)

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*“Participants noted that ineffective learning results from a mismatch between the curriculum and teaching practices. They added that entrepreneurship education in South Africa remains predominantly theoretical, offering few practical or interactive learning experiences.”* (Focus Group 5/CODEG5BST, participant 5)

*“..... our entrepreneurship learning predominantly focuses on theory concepts and lacks the practical learning that enables graduates to observe and experiment with the acquired skills and knowledge. Hence, this creates a substantial gap which impedes our entrepreneurial mindset and intention.”* (Focus Group 7/CODEG7BST, participant 4)

Consequently, the participants from non-business programmes commented as follows:

*“.... The lack of alignment between content delivery and the pedagogical approach has hindered our motivation for entrepreneurial pursuits. Notably, the absence of workshops or seminars limits opportunities to showcase ideas and engage with industry experts.”* (Focus Group 9/CODEG9NBST, participants 2 & 4)

*“We had no idea about the delivery method, as we had never been exposed to entrepreneurship education in our department.”* (Focus Group 12/CODEG12NBST, all participants echoed this)

These findings align with those of Cui et al. (2021), who noted that the delivery approach to entrepreneurship education in South Africa often lacks alignment and practical application. This impeded graduates' ability to learn from real-world examples and participate in collaborative problem-solving. As a result, graduates were not inspired to enter entrepreneurial ventures.

#### *4.2.4. Non-Business Programmes Inclusivity*

While examining the universality of entrepreneurship education curriculum in non-business programmes, most participants (75%) confirmed that an entrepreneurship learning curriculum was not universal in South Africa. Notably, this has prevented graduates from non-business programmes who aspire to pursue entrepreneurship as a career from succeeding. The experiences of non-business programme graduates are reflected below:

*“.... Regrettably, entrepreneurship education remains absent from the curriculum of non-business programmes. Integrating entrepreneurship curriculum into non-business programmes would be a strategic step toward ensuring that all graduates are meaningfully engaged in entrepreneurial education.”* (Focus Group /CODEG9NBST, all participants)

*“Entrepreneurship education is not currently integrated into our module. However, incorporating this learning into the non-business programme curriculum would be highly beneficial, as it offers substantial potential for promoting self-employment intentions and encouraging entrepreneurial exploration among students.”* (Focus Group 11/CODEG11NBST, participants 1, 2 & 4)

*“Even among non-business faculties, specific departments within our institution lack the integration of an entrepreneurship curriculum into their module, thereby denying students the opportunity to engage with entrepreneurial learning.”* (Focus Group 12/CODEG12NBST, participants 2 & 4)

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#### 4.2.5. System Structure

While analysing the findings on the non-integration of entrepreneurship curriculum into non-business programmes, it is evident that this hinders potential graduates who aspire to become entrepreneurs. This observation aligns with the arguments of Vorvornator & Midiniso (2025) and Sirelkhatim and Gangi (2015), who assert that incorporating entrepreneurship education into non-business curricula effectively promotes entrepreneurial aspirations among graduates in these faculties. This theme emerged from all the participants' responses, which revealed that the system's structure plays a significant role in motivating graduates to pursue entrepreneurship education. The lack of a system structure that supports graduates in pursuing entrepreneurship hinders entrepreneurial intentions. This resonated with the respondents' experiences as follows.

*“The absence of a supportive institutional framework considerably heightens the challenges faced by graduates in developing and advancing entrepreneurial ideas.”* (Focus Group 2/CODEG2BST, participants 3 & 4)

*“We contend that the absence of an institutional framework to support the financing of graduates' business ideas poses a significant barrier to our entrepreneurial aspirations. In the absence of such support, many promising ideas fail to progress beyond the initial stages of development.”* (Focus Group 3/CODEG3BST, participants 4 & 5)

*“Yes, institutionally, it prevents students from developing their creative ideas. Every business requires funding and financial support to thrive. However, this challenge affects us, particularly those with disadvantaged backgrounds, as we often lack the funds necessary for business development.”* (Focus Group 5/CODEG5BST, all participants echoed this)

An analysis of participants' responses showed that institutional failure to provide adequate support significantly undermines the development of entrepreneurial intentions among graduates.

#### 4.2.6. Practical Lecturers

In entrepreneurship education, identifying who is best positioned to teach entrepreneurship is fundamental. This theme emerged from this study as the participants believed that the lack of innovative lecturers hindered their entrepreneurial spirit.

*“.... we lack innovative educators who are competent enough to nurture entrepreneurial ideas, as the current lectures primarily offer theoretical instruction, suggesting a lack of practical expertise. We need practical knowledge to improve graduate stimulation in pursuing entrepreneurship as a career.”* (Focus Group 2/CODEG2BST, participants 1, 4 & 5)

*“We believe that those who should teach entrepreneurship are academic lecturers who specialise in the field and serve as mentors to their graduates, a role that is currently lacking in the entrepreneurship education curriculum in South Africa.”* (Focus Group 6/CODEG6BST, participants 4 & 5)

In contrast, the participants in this group had this to say:

*“..... our lecturers are knowledgeable, but the delivery methods used in entrepreneurship education are demotivating and discourage us from pursuing entrepreneurship.”* (Focus Group 9/CODEG9NBST, participants 1, 3 & 4)

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While analysing the participants' feedback, it is worth noting a strong consensus that educators play a vital role in delivering entrepreneurial learning that develops entrepreneurial intention among graduates. However, the participants considered the lack of lecturer innovation a barrier that hindered the cultivation of entrepreneurs' interest. Notably, Iwu et al. (2021) emphasised the importance of competent educators in teaching entrepreneurship education in South Africa.

### **4.3. Discussion of the Findings**

The entrepreneurship education that motivates graduates to pursue entrepreneurship as a career path depends heavily on the curriculum framework and the pedagogical strategies adopted (Iwu et al., 2021). Drawing on feedback from the majority of participants within the selected institutions, the study emphasised that the absence of early exposure to entrepreneurship education reduces graduates' motivation. The lack of early involvement in entrepreneurship hinders the stimulation that would enable them to develop an entrepreneurial interest and an understanding of opportunities before their field of specialisation (Kariv et al., 2025). Ultimately, the findings of the study validate Paek et al.'s (2021) report, which highlighted that early engagement in entrepreneurship education affects entrepreneurial intention among graduates. Overall, Nzembayie et al. (2024) maintains that for curriculum and pedagogy to develop graduates with an entrepreneurial mindset, the integration of early entrepreneurship engagement into the curriculum should be evaluated.

The practicality of entrepreneurship education is the ultimate strategy for designing curriculum and pedagogy, as it aims to provide graduates with active entrepreneurial learning (Haneberg et al., 2022). The majority of the students' responses who participated in the study revealed that the entrepreneurship curriculum and pedagogy are limited in applying experiential learning, such as project-based tasks, development of business plans, mentorship and work-integrated programmes, which, in a manner, hinder the active learning approach (Bell & Bell, 2020). These findings support Iwu's (2022) and Mukhtar et al.'s (2021) studies, which emphasised that the lack of an experiential approach in the delivery of entrepreneurship education hinders graduates from engaging in active learning that enables them to apply their initiative in real-world settings. In a nutshell, this approach places a solid emphasis on hands-on experiential learning as it helps students build skills and knowledge, tackle issues, and provide solutions, ensuring that entrepreneurship learning bridges theory and practice (Gryazeva-Dobshinskaya et al., 2020; Lackéus, 2020; Lee, 2020).

The alignment of the entrepreneurship curriculum and its teaching methods is a vital factor in dynamic learning that fosters active learning and produces entrepreneurial graduates in South Africa (Mukhtar et al., 2021). While the participants' responses indicated a lack of adoption of the combination of the curriculum and pedagogy in the delivery of entrepreneurship education, which discourages students from pursuing an entrepreneurial career path, they also highlighted the need for specific methods to translate ideas into implementation (Olotuase et al., 2023). The findings of Lackéus' (2020) study align with participants' feedback that the pedagogical approach to delivering entrepreneurship is not aligned with entrepreneurial goals, as the delivery is predominantly theoretical and less interactive, experiential, and problem-solving. Thus, integrating learning experiments with theory-based learning fosters alignment and nurtures young people's entrepreneurial interest (Nabi et al., 2017).

The accessibility of entrepreneurship education to non-business programme students is essential for promoting entrepreneurial interest (Vorvornator & Midiniso, 2025). The absence of incorporating entrepreneurship education into an interdisciplinary programme has created an

entrepreneurial intention gap, leading to self-employment among graduates as most participants echoed. Similarly, the studies conducted by Nzembayie et al. (2024) and Vorvornator and Midiniso (2025) highlighted that the lack of integration of entrepreneurship education with non-business disciplines affects students' participation and limits entrepreneurial uptake. Hence, non-business students need to be provided with entrepreneurship education in order to foster innovative learning across disciplines (Jones, 2019; Jones et al., 2017).

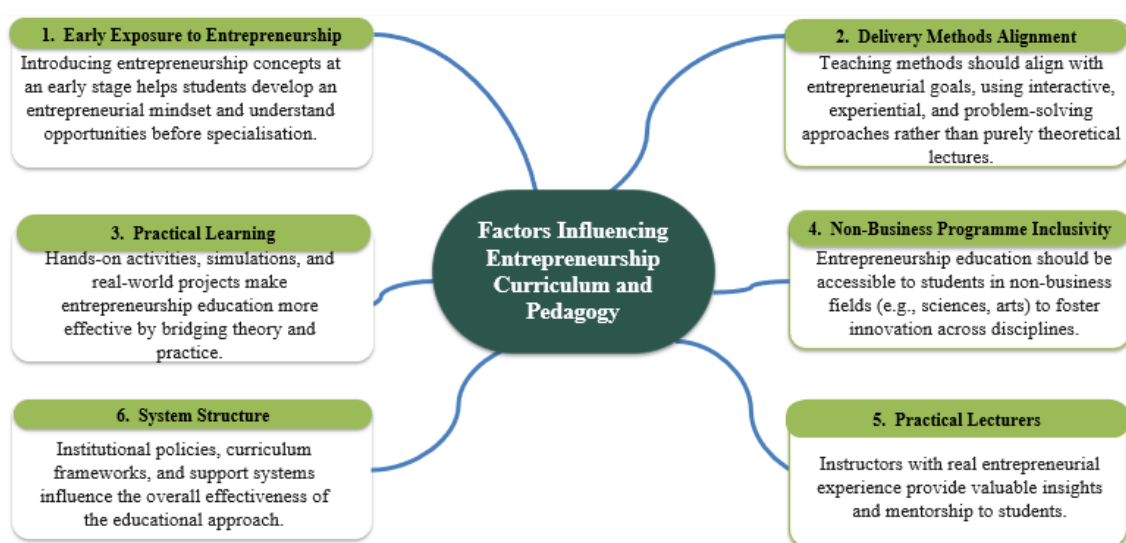
Building a systemic structure to oversee the impact of well-structured curriculum and pedagogy on the delivery of entrepreneurship is vital (Mahadea & Kabange, 2024). While the majority of participants highlighted the lack of a well-systemic framework as hindering the effectiveness of the curriculum and pedagogical delivery. For instance, offering entrepreneurship education as a module, lacking a combination of curriculum and pedagogy, and limited to non-business disciplines, has deprived aspiring graduate entrepreneurs of opportunities. These findings align with Kuratko and Morris (2018), who emphasised that a weak systemic structure hinders the provision of a comprehensive entrepreneurial environment that fosters skills development, thereby reducing the impact of unemployment on the economy.

In entrepreneurship education, who teaches the curriculum is essential because learning leads to the development of graduate entrepreneurs (Iwu, 2022). The majority of participants reported that lecturers in entrepreneurship education lack the competencies required for innovative learning and prioritise the theoretical component over the practical. Notably, Cui et al. (2019) highlighted that the lack of competent educators has been identified as a key challenge for entrepreneurship curriculum and pedagogy, which hinders entrepreneurial intention among graduates. Matlay (2018) emphasised that employing lecturers who are knowledgeable in delivering entrepreneurship education will enable them to provide valuable insights and mentorship to graduates, helping them build entrepreneurial skills.

#### 4.4. Summary of the Study

Figure 3 illustrates the factors that influence the curriculum and pedagogy and their impact on stimulating graduates' entrepreneurial uptake.

FIGURE 3. SIX PILLARS OF EFFECTIVE ENTREPRENEURSHIP CURRICULUM AND PEDAGOGY



Source: authors' own compilation

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## 5. Conclusion and Recommendations

### 5.1. Conclusion

The findings from participants in the study suggest that within the two universities investigated, several learning components, specifically, the curriculum and pedagogical practices used in entrepreneurship education, appear to fall short in meaningfully shaping graduates' entrepreneurial uptake. Participants highlighted that limited early exposure to entrepreneurship education may restrict students' ability to develop an entrepreneurial mindset during their foundational year of study. Likewise, the predominance of a theoretically oriented curriculum, with minimal practical or experiential integration, was perceived as reducing opportunities for hands-on learning that could strengthen entrepreneurial readiness.

While these insights point to a misalignment between the intended outcomes of the entrepreneurship curriculum and its classroom implementation. According to the participants, pedagogical strategies did not consistently foster creativity, critical thinking, or innovation, skills commonly associated with entrepreneurial development. Additionally, the programme was not widely viewed as interdisciplinary, with limited evidence of intentional integration to diverse academic fields. The absence of an overcharging system structure was perceived to contribute to fragmented delivery and an inconsistent learning experience. Participants also noted concerns about educator preparedness, highlighting that educators lacked the pedagogical competencies and innovative teaching methods required to reflect the dynamic nature of entrepreneurship.

While these findings were reflected within the studied institution, it remains necessary to strategically address these challenges. The entrepreneurship curriculum and pedagogy may require a more comprehensive transformation that includes early student involvement in entrepreneurship, integrating practical applications into delivery, promoting interdisciplinary collaboration, and adopting innovative pedagogical frameworks. These reforms have the potential to enhance students' entrepreneurial intentions. However, additional empirical evidence would be needed to determine their broader contribution to venture and job creation in South Africa.

### 5.2. Study Constraints

While all research has limitations, acknowledging them enhances transparency and guides future inquiry. This qualitative study has several methodological and contextual constraints. First, the use of purposive sampling, appropriate for qualitative research, limits generalisability because participants were selected for relevance rather than representativeness. Second, the sample size of 60 students from two universities restricts the diversity of perspectives and may not reflect experiences across other South African institutions. Third, focus group discussions, although rich in insights, are susceptible to group dynamics, the dominance of certain voices, and social-desirability bias. Additionally, the study's focus on two Cape Town universities introduces geographical limitations, as institutional contexts vary nationally. Finally, the exclusive use of qualitative methods means the findings do not provide statistical evidence. Future studies should consider mixed-methods or quantitative approaches to test these themes on larger and more diverse samples.

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### 5.3. Proposed Actions

The findings indicated that the lack of entrepreneurship education being offered as a discipline is a significant factor affecting early exposure to entrepreneurial learning, thereby impeding entrepreneurship intention and interest. Therefore, the researcher recommends implementing an entrepreneurship education curriculum as a field of study.

While integrating entrepreneurship education curriculum into non-business programmes is imperative, the researcher recommends embedding an entrepreneurship education curriculum as an interdisciplinary module tailored for non-business disciplines, thereby ensuring a comprehensive and holistic learning experience for graduates.

The study's findings highlighted the importance of experiential learning in entrepreneurship education curriculum and pedagogy, as well as its effectiveness in developing practical skills, such as creativity and idea generation, through project- and case-based activities. Considering the above, the researcher recommends integrating experiential learning theory to develop a more comprehensive and effective curriculum and pedagogy for entrepreneurship education.

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# GILE Journal of Skills Development

## How to Protect Integrity of Research in the Age of Social Media?

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### Abstract

Artificial Intelligence (AI), data-driven decisions and evidence-based approaches appear to become increasingly important when establishing credibility and authority in non-academic circles. Knowing the difference between an experiment meant to illustrate a point, doing research for a degree where rigor and ethics are crucial, and doing research in a business context have transformed into a skill not only relevant for academics, but progressively for anyone reading articles on the Internet and on social media. On social media algorithms drive visibility not rigor and ethics. An experiment conducted on LinkedIn in October 2025 describes what happens when two nearly identical articles are posted at the same time and how algorithms drive visibility and conversations. Simultaneously, a critical reflection of how to identify “good research” from a practitioners’ perspective is provided. Finally, assessment criteria for the layperson are provided to foster awareness and to promote skill development and literacy in an era in which making sense to data in a self-reliant manner are indispensable across all social strata. Key findings of the experiment highlight the importance of scientific rigor also in online research and demonstrate how easily bias and uncontrolled variables, such as resharing behaviour, can distort outcomes and conclusions. Subsequent studies may refine this initial experiment by employing more rigorous methodologies and adhering to established ethical standards in research.

**Keywords:** research, social media, credibility, skill development

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## 1. Introduction

In October 2025, one of the authors conducted an experiment on LinkedIn by simultaneously posting two articles. Both posts used identical imagery and tone, yet their titles and foci were entirely different. Article 1 (Isaacson, 2025a) discussed five reasons why scientific research might be harmful within a particular profession, whereas Article 2 (Isaacson, 2025b) emphasised the absolute necessity of research in the same field.

The conversation that followed anticipated the author's intention to create a third post (Isaacson, 2025c) revealing the results of the experiment. The aim was to test the assumption that the post highlighting potential harm ("harm post") would attract more engagement than the post advocating the benefits ("help post"). While the method of 'appealing' is attractive and revealing, predicting user behaviour presents notable challenges. Particularly when employing comments, reshares, and like functions as tools for research data collection. Such practices do not meet rigorous research standards and have proven to be fundamentally flawed in this experiment.

This experiment highlights the need to increase awareness and develop skills, both in academic and non-academic spheres, regarding the dual impact of today's "click economy" and AI-driven practices on research and science as also supported by Casas-Puente and Gutiérrez-Leyton (2025). On one hand, these forces improve accessibility and visibility; on the other, they expose researchers and their work to greater vulnerability, particularly when attention and consumption overshadow genuine curiosity. O'Brien et al. (2021) underscore the necessity for critical evaluation of scientific information to minimise the spread of false and biased claims, and to fully realise the benefits that research and science provide.

Seth (2026), during her Thinkers50 presentation in November 2025, stresses that research should be viewed as a tool for discovery rather than justification. She warns against detaching research results from their original context and repurposing them to fit personal or organisational agendas, as this undermines the rigor and diligence invested in the original work. Seth also describes the phenomenon of "catchphraseitis", where profound research ideas are reduced to catchy phrases or buzzwords, intended to attract attention rather than encourage critical reflection.

Taddicken and Krämer (2021) discuss the opportunities and challenges that arise when both experts and laypeople share and generate content about research on social media. They call for further research into these evolving forms of science communication. The credibility of research as a discipline appears increasingly tested, as researchers have limited control over how and by whom their work is disseminated on social platforms. There is a clear distinction to be made between using research to drive social media traffic and genuinely highlighting researchers' contributions to share knowledge in an authentic, non-sensational manner.

To address these challenges, it is essential to maintain the free flow of information as a fundamental element of democracy, ensuring that it is not overregulated, and yet that the system would protect against bad practices. Education and awareness for both writers and readers are critical. By fostering informed and responsible sharing practices, we can support researchers and their work, preventing harm from both creators of research and readers who may misuse it, whether maliciously or unintentionally. Research itself is not inherently harmful. However, misuse, sensationalism, and the absence of ethical standards or proper data collection can

undermine its integrity. Therefore, it is essential to educate readers on how to distinguish between rigorous research and less credible practices.

## 2. Distinguishing and Evaluating Research Shared on Social Media

It is important to recognise the difference between various types of research publications, particularly when encountering research papers or findings that are shared on social media platforms. Reading and analysing such content critically are essential, as not all publications go through the same level of scrutiny or review, and these practices are not universal.

In academia, social media posts are commonly classified as ‘grey literature’. Grey literature refers to any publication that conveys an author’s opinion without having undergone a formal review process. This definition extends beyond social media posts to include books, company reports, and articles produced by thought leaders, whether published on personal blogs or social media platforms (Gilchrist & Perks, 2023). The notable reputation or prominence of the author does not exclude their work from being considered grey literature, even though the technology offers benefits of democratisation, enabling insights to be shared without needing to go through gatekeepers who have their own agendas and, potentially, large marketing budgets to ‘grease the wheels’ (Yoshida et al., 2024).

Students and researchers embarking on their academic studies are typically taught early on how to identify which types of grey literature are trustworthy and suitable for inclusion in their own research. They are advised to consider the credibility of sources carefully and are often encouraged to prioritise peer-reviewed book chapters or journal articles, as these sources are more likely to present rigorous, evidence-based findings (Sovacool et al., 2022). Simultaneously, as data from Casas-Puente and Gutiérrez-Leyton (2025) highlight, internet and social media literacy are lagging among university students.

TABLE 1. CRAAP ACRONYM

Letter	Aspect	Questions/Considerations
C	Currency	How up-to-date is the information? Was more dated research chosen to prove a point? Has newer research succeeded the source referenced in the meantime?
R	Relevance	How relevant is the piece for your context? How relevant is the context for you in which the research took place?
A	Authority	Who is the author affiliated with? Does research support an aspect of their business? Is there a section describing positionality or conflict of interest in the paper? Is there transparency about the role of the author as researcher?
A	Accuracy	Is the information supported by evidence? Has it been reviewed? What does the tone sound like: matter of fact, sensational, biased, emotional, presenting different perspectives?
P	Purpose	Why is the author sharing the information? What is the intention and what are possible benefits for the author/the reader? Are there indicators for bias or conflicts of interest?

Source: own compilation based on Lasky (2024), 2026

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The CRAAP test (Lasky, 2024) offers a practical checklist to assess a source's reliability, serving as a more mature version of the "5 reasons" proposed in the LinkedIn articles (Isaacson, 2025a; 2025b). This test enables users to quickly assess the quality and trustworthiness of the information being presented. Table 1, "CRAAP Acronym", offers further explanation of each letter in the acronym, guiding readers through the evaluation process.

### 3. Conclusion

Research does not inherently cause harm to any profession or topic. Its true value lies in its ability to contribute meaningful insights, generate new knowledge, and encourage critical thinking. However, harm can arise from the misuse or abuse of research, particularly by readers or contributors on social media and mainstream media. Such harm is likely when quick checks for accuracy and credibility are neglected, leading to misinformation or misrepresentation of findings, even when the research itself has followed a sound approach. Researchers play an essential role in advancing knowledge and provoking thoughtful discussion. When their work is appropriately interpreted and disseminated, it serves as a powerful tool for discovery and informed decision-making. Yet the rise of sensationalism on social media, driven by the pursuit of clicks and the demands of algorithms, can distort research findings, diminishing their intended purpose and impact. Furthermore, insufficient ethical standards in data collection practices may result in harm. Although curiosity, not academic rigor, was the driving force behind this experiment, it effectively demonstrated the unpredictability of social media and user behaviour, highlighting how research outcomes can be readily influenced. Future research may expand upon this experiment by employing methodologies that adhere to rigorous academic standards.

To safeguard the integrity of research as a discipline, it is vital that readers become more educated and capable of distinguishing credible research from opinion or sensational content. Research should be employed as it was intended: as a means of discovery and as a foundation for making informed choices, considering a range of perspectives rather than relying solely on a single viewpoint, regardless of its source or the reputation of the individual presenting it.

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# GILE Journal of Skills Development

## AI and VUCA Are Here to Stay - What Should Business Schools Teach and How?

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### Abstract

Drawing on recent conceptual and empirical work on metamodern education, Higher Education 4.0, and transdisciplinary AI-interoperable competencies, alongside European Commission and UNESCO policy frameworks, this food-for-thought article adopts an integrative approach that synthesises research evidence, policy analysis, and practice-based insights for business education leadership and management. As AI and persistent social crises and VUCA/BANI conditions have become structural features of contemporary organisational and educational life, business schools are now at the centre of intersecting technological, geopolitical, and societal disruptions. Against this backdrop, this article addresses a central question for higher education: what should business schools teach (and, more importantly, how) when uncertainty, crisis, and AI-mediated decision-making are no longer exceptional but systemic. The analysis demonstrates that traditional discipline-centred and tool-oriented pedagogies are, while still foundational, increasingly strained by the realities graduates face in AI-mediated and crisis-shaped environments and are no longer adequate on their own. Instead, effective business education requires a shift toward cultivating navigational capacities, including systems thinking, intercultural competence, ethical judgment, emotional resilience, and context-aware AI literacy. The article further argues that evolutionary pedagogies (such as case-based learning, simulations, project work under uncertainty, and reflective practice) are particularly effective in developing these capacities. It concludes that business schools can no longer define their mission primarily in terms of knowledge transmission or skills optimisation. Instead, they are called to assume a renewed social contract: preparing leaders capable of responsible action, ethical sensemaking, and sustained agency in AI-mediated, crisis-shaped environments, with significant implications for curriculum design, faculty roles, and higher education policy.

**Keywords:** Artificial Intelligence; Business Education; Digital Competence; Educational Leadership; Higher Education; Transdisciplinary Competences

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## 1. Introduction

Business schools now operate at the epicentre of profound and overlapping disruptions. Artificial intelligence, geopolitical instability, climate-related shocks, supply-chain fragility, information warfare, and widespread psychological strain have collapsed the traditional distinction between periods of stability and moments of crisis. The VUCA and BANI conditions long discussed in executive education are no longer hypothetical scenarios; they constitute the everyday operating environment of organisations and leaders.

The concepts of **VUCA** (Volatility, Uncertainty, Complexity, and Ambiguity) and the more recent **BANI** framework (Brittle, Anxious, Non-linear, and Incomprehensible systems) were originally developed to describe strategic and organisational environments marked by rapid change and limited predictability (Bennett & Lemoine, 2014). While initially articulated in military and executive contexts, these frameworks have increasingly been applied to higher education to account for a structural shift rather than a temporary condition (Barnett, 2018; Morin, 2008). From a complexity perspective, contemporary organisations and HiEd institutions, business schools in particular) operate as systems in which outcomes are shaped by emergent qualities arising from interactions among actors, technologies, and institutional constraints rather than by linear cause–effect relationships.

Drawing on the **Cynefin framework**, Snowden and Rancati (2021) emphasise that in such complex contexts effective action depends on continuous sensemaking, attentiveness to contextual signals, and adaptive responses, rather than on the application of predefined best practices. Complementing this view, Juarrero (2023) demonstrates that context and constraints generate coherence in complex systems, underscoring that decision-making, learning, and leadership cannot be abstracted from the conditions in which they unfold. Universities therefore no longer operate through alternating cycles of stability and disruption; instead, they function within environments where technological acceleration, geopolitical instability, societal polarisation, and psychological strain coexist as persistent features of everyday academic and organisational life (OECD, 2019; UNESCO, 2021; World Economic Forum, 2025). In this sense, VUCA and BANI do not describe exceptional moments of crisis, but the baseline conditions under which teaching, learning, leadership, and decision-making now occur in higher and business education.

Recent scholarship on metamodern education, Higher Education 4.0, and transdisciplinary AI-interoperable competencies converges on a shared conclusion: knowledge is no longer scarce, and the transmission of knowledge is no longer the university's distinctive contribution. Education increasingly functions as a form of *co-navigation* while supporting individuals and organisations in orienting themselves within unstable, AI-saturated environments rather than supplying definitive answers (Shtaltovna, 2024, 2025; Shtaltovna & Makhachashvili, 2025). Universities are increasingly expected to move beyond knowledge transmission toward enhancing students' holistic capabilities for work, life, and sustained agency in complex and uncertain environments, reflecting a broader shift in the social and developmental role of higher education (Jakubik et al., 2023).

In this context, the central question facing business education is no longer whether curricula should be updated or whether new digital tools should be integrated. The more fundamental issue concerns re-centring educational purpose: what kinds of human capacities business schools are expected to cultivate when uncertainty, complexity, and AI-mediated decision-making are permanent features of professional life.

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## 2. What to Teach: From Disciplinary Knowledge to Navigational Capacities

The shift from postmodern to metamodern educational paradigms highlights a movement away from fragmented knowledge toward the capacity to hold contradiction, ambiguity, and plurality (Shtaltovna, 2024). Within business education, this shift implies a critical reassessment of disciplinary primacy. While foundational knowledge remains necessary, it is no longer sufficient on its own to prepare graduates for decision-making under persistent uncertainty and AI-mediated conditions. Empirical evidence from business education delivered under conditions of prolonged crisis suggest that learners are less concerned with identifying correct answers than with developing judgment under uncertainty. Questions increasingly focus on decision-making with incomplete data, ethical action under pressure, cross-cultural coordination, and psychological sustainability in unstable environments.

Accordingly, contemporary business education is advised to prioritise **transdisciplinary capacities for preparing future leaders** (Shtaltovna & Makhachashvili, 2025), including:

- systems thinking and metacognitive awareness;
- intercultural and communicative competence as core professional infrastructure;
- digital and AI literacy understood as critical comprehension of algorithmic logic, limitations, and risks;
- inner development capacities, such as self-reflection, resilience, and values-based orientation (Inner Development Goals, 2021).

Research on transdisciplinary competencies indicates that these internal and socio-emotional capacities function as the connective tissue between labour-market expectations, AI-driven organisational contexts, and human viability under conditions of crisis. Within business schools, such capacities increasingly define leadership readiness more accurately than technical expertise alone.

## 3. How to Teach: Education without the Illusion of Stability

The acceleration of AI adoption and the persistence of systemic crises have rendered the limitations of traditional pedagogical models more visible, particularly when these models are applied in isolation from experiential, reflective, and context-aware learning designs. Lecture-based knowledge transmission proves increasingly ineffective, not because learners have changed, but because the environments in which knowledge is applied have become non-linear, time-compressed, and context-dependent (Aoun, 2017; Barnett, 2018).

Effective business education in AI- and crisis-shaped contexts increasingly relies on the systematic integration of evolutionary pedagogies, which in many institutions already exist but often remain peripheral to core curriculum design, including:

- learning through real-time and real-crisis cases;
- simulations of complex managerial, ethical, and intercultural situations;
- project-based and team-based work conducted under high uncertainty;

- 
- structured reflective practices enabling learners to process emotional, ethical, and cognitive responses.

Within such pedagogical designs, AI functions neither as a substitute for educators nor as a shortcut to solutions. Instead, it operates as a cognitive mirror, a hypothesis-testing partner, and a tool for scenario exploration, provided that ethical boundaries and accountability remain explicit (UNESCO, 2023).

From a pedagogical perspective, the European Commission's AI Excellence agenda provides a concrete orientation for *how* AI should be taught in higher education, particularly in business schools operating under conditions of persistent uncertainty. Its focus on enabling conditions for AI development and uptake underscores the need for graduates to understand AI as an infrastructural and organisational phenomenon rather than a standalone technology, which calls for curricula that integrate AI across disciplines and decision contexts (European Commission, 2022a). At the same time, the Commission's emphasis on ensuring that AI works for people foregrounds ethical reasoning, human oversight, and responsibility, reinforcing the need to embed reflective practice, values-based deliberation, and ethical sensemaking into AI-related teaching (European Commission, 2022b).

Building strategic leadership in high-impact sectors builds on AI education with leadership development, suggesting pedagogies that emphasise systems thinking, strategic judgment, and action under uncertainty rather than technical optimisation alone (European Commission, 2022c). Finally, the focus on thriving from the lab to the market highlights the importance of experiential and project-based learning, where students engage with AI in realistic innovation, governance, and implementation settings that mirror market and societal constraints (European Commission, 2022d). Taken together, these policy orientations reinforce a core implication for higher education: teaching AI is inseparable from teaching how to think, decide, and act responsibly within AI-mediated, crisis-shaped environments.

AI-enabled cases for intercultural competence development in business education illustrate a growing body of recent case-based and empirical studies examining how digital technologies (particularly AI-enabled and immersive tools) are being used to support intercultural competence development across higher education and business schools contexts. The latest international case studies analysis (Kasbekar & Shtaltovna, 2026) demonstrates that culturally responsive AI design shapes learning outcomes differently across regions and institutional settings, underscoring the importance of contextual sensitivity in AI-supported intercultural education (Arif, 2025; Shonfeld, 2024).

AI-driven frameworks and adaptive learning systems can enhance specific dimensions of intercultural communicative competence, including cultural awareness, attitudinal openness, and communication skills, when aligned with clearly structured instructional tasks and guided reflection (Ma & Yang, 2025; Zhang et al., 2025). Complementary studies in cross-cultural management education highlight that guided experiential learning and intercultural simulations (both digital, hybrid and face-to-face) are particularly effective when learners are supported through reflective cycles that foster behavioural adaptation, rather than surface-level cultural knowledge acquisition (Heidemann & Søndergaard, 2023).

In business management education, blended and technology-facilitated international collaboration formats further illustrate how AI-enabled tools, virtual exchanges, and case-based

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pedagogies can bridge theory and practice when embedded in intentional experiential designs (Bleicher et al., 2025; Fletcher & Calixto, 2025). At the same time, emerging work on generative AI highlights both the pedagogical potential and the ethical risks of AI-simulated debates and AI-generated case materials, reinforcing the need for critical, inclusive, and bias-aware design principles in future-ready intercultural curricula (Huiying & Qiang, 2021; Jayasinghe et al., 2025; Li et al., 2025).

A much-awaited Digital Competence Framework from the European Commission gives their own answers and offers guidelines for AI integration in Higher Education (Cosgrove & Cachia, 2025). A key novelty of DigiComp 3.0 compared to DigiComp 2.0 (European Commission, 2022) lies in its systematic and transversal integration of AI competence as a pedagogical principle for higher education, rather than as a discrete technical subject. Instead of positioning artificial intelligence as a standalone or advanced add-on, DigiComp 3.0 frames AI as one digital technology embedded across broader digital competences, thereby shifting teaching away from tool training toward the development of judgment, responsibility, and contextual awareness.

AI-related knowledge, skills, and attitudes are embedded across all 21 competences and articulated at every level of the framework (from competence areas to concrete learning outcomes) signalling that AI should be taught through authentic learning tasks, interdisciplinary problem-solving, and reflective practice rather than isolated modules. Reinforced across the four proficiency levels (Basic, Intermediate, Advanced, and Highly Advanced), this approach supports progressive learning designs in higher education, in which students engage with AI in increasingly complex, uncertain, and ethically charged contexts. In this sense, DigiComp 3.0 operationalises the European Commission's broader message for higher education: teaching with AI is inseparable from teaching *how to think, decide, and act responsibly* in AI-mediated and crisis-shaped environments.

Within broader intercultural competence (ICC), international management, and cross-cultural leadership curricula, such cases can be strategically integrated at multiple stages of the learning cycle and across different course formats.

At the **Basic level**, they are particularly suitable for sensitisation and framing activities (such as early-semester discussions, diagnostic exercises, or scaffolded simulations) to surface cultural assumptions and ethical considerations surrounding AI-mediated interaction. At the **Intermediate level**, these cases can be embedded in experiential modules, including virtual intercultural negotiations, team-based problem-solving tasks, or blended Collaborative Online International Learning or COIL-style collaborations, where students actively apply ICC concepts to complex, technology-mediated scenarios. At the **Advanced level**, they can support scenario planning, leadership reflection, and strategic decision-making exercises, enabling learners to critically evaluate the cultural, organisational, and ethical implications of AI-enabled management practices across regions.

Across all levels, such cases are most effective when embedded within **reflective learning designs** (including guided debriefings, comparative cultural analysis, and leadership self-assessment) thereby linking intercultural competence development with international management judgment and cross-cultural leadership capacity under VUCA and BANI conditions.

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## 4. Business Education in Prolonged Crisis: An Applied Laboratory

Between 2022 and 2025, business education in contexts affected by war and systemic disruption has operated as an applied laboratory for future-oriented learning. Business relocation, coordination with international stakeholders, distributed team leadership across borders, and decision-making under information pressure have become routine educational material rather than exceptional case studies. These conditions have clarified a central insight: intercultural competence, emotional resilience, and AI literacy are not auxiliary or “soft” skills; they are survival and leadership capacities (World Economic Forum, 2025).

Theoretical work on complexity reinforces this observation. Juarrero (2023) argues that context and constraints generate coherence in complex systems. Education, therefore, cannot be designed independently of context; it must enable learners to recognise situational frames, understand constraints, and act responsibly within them.

This logic is operationalised in the European Commission’s field guide *Managing Complexity (and Chaos) in Times of Crisis* (Snowden & Rancati, 2021), which applies the Cynefin framework to crisis decision-making. By emphasising context recognition, boundary management, informal sensing networks, and adaptive action, the guide provides a directly applicable framework for leadership development and business education in AI- and crisis-driven environments. As AI systems increasingly mediate information access and analysis, the role of business educators is undergoing a structural shift. Educators function less as sources of authoritative knowledge and more as architects of learning environments characterised by trust, psychological safety, and cognitive challenge.

Learners require spaces in which ideas can be tested, assumptions questioned, and failures explored with minimal reputational risk. Such environments depend on facilitation, moderation, and ethical guidance rather than control or surveillance. Notably, these relational and sensemaking functions remain among the least automatable dimensions of education.

## 5. Conclusions

Business schools have long recognised that predictability and linear career trajectories are increasingly difficult to promise; what has changed is the speed, scale, and permanence with which uncertainty, systemic fragility, and AI-mediated decision-making now shape professional life. Long-assumed stability underpinning managerial education has been replaced by persistent uncertainty, systemic fragility, and rapid technological change (OECD, 2019). AI may function as a destabilising force when deployed without ethical or contextual awareness. Alternatively, it can serve as a navigational instrument while supporting better questions, adaptive judgment, and informed action in complex environments (Snowden & Rancati, 2021).

As Food for Thought offered here, this article invites educators, curriculum designers, and institutional leaders to reflect on how existing practices might be repositioned (moving from the periphery to the centre) to respond more coherently to the baseline conditions of VUCA and BANI that now define higher education. Discussed developments do not suggest a wholesale rejection of existing business education models. Rather, they indicate a need to re-centre intercultural competence, AI literacy, and reflective sensemaking as core elements of leadership preparation under conditions of complexity and uncertainty. If and when embedded intentionally, AI-enabled

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cases and simulations function less as technological enhancements and more as sensemaking infrastructures; these cases could consequently enable learners to engage with ambiguity, cultural difference, and ethical tension in ways that mirror contemporary organisational realities.

Seen in this light, the renewed mandate of business schools is not to predict or control an uncertain future, but to cultivate the human capacities required to navigate it. This orientation reframes the role of business education from knowledge transmission or skills optimisation toward supporting sustained agency, responsible decision-making, human-centred and intercultural leadership in AI-mediated environments.

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