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What does 'good teaching' mean in the AI age?

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Introduction

Good teaching in the AI era remains what it has always been: a willingness to do whatever helps students learn (Brookfield et al., 2023). In *Teaching Well*, Brookfield et al. (2023) elaborate a learning-centred pedagogy—classroom democratisation, critical thinking and reflection, and the ethical negotiation of power—that does not become obsolete when a new technology arrives. Yet the rise of generative AI (e.g., ChatGPT, Gemini, Copilot, Claude, Perplexity, and DeepSeek) has provoked both exuberance and anxiety across higher education (Rudolph et al., 2025). Public discourse oscillates between 'job-killer' narratives and boosterish promises of frictionless productivity, and the higher education sector is not immune to either (Rudolph et al., 2023). Against this backdrop, we anchor our analysis in what *Teaching Well* articulates as good teaching and examine how its core commitments can be defended—and, where needed, critically recontextualised—in the AI age.

In this Editorial, we critically examine GenAI's implications for good teaching in higher education. Using Teaching Well as our conceptual compass, we affirm that the fundamentals of effective teaching remain indispensable. We argue that techno-optimistic narratives require tempering: AI can augment teaching and learning, but it cannot substitute the human dimensions of pedagogy.

At the same time, we recognise that to uphold academic integrity, certain practices cannot remain unchanged in the face of AI's impact. In particular, assessment design requires urgent critique lest we fall into performative or uncritical integration—for example, slapping an 'AI-enabled' label to legacy tasks without substantive rethink and where necessary redesign, or imposing nominal 'No-AI' prohibitions that are neither enforced nor educationally justified (Perkins et al., 2025). We draw on Perkins et al.'s (2025) AI Assessment Scale (AIAS) to explore how educators can productively reshape their assessment tasks, ensuring the use of AI is in alignment with sound pedagogical principles, rather than resorting to reactive or cosmetic measures.

The phrase "AI age" is defensible as shorthand for the accelerated diffusion of generative systems reshaping knowledge production, access, and assessment (Rudolph et al., 2023). Yet the label also risks reifying vendor narratives and collapsing important continuities in educational purpose, values, and ethics—precisely the hype that critical scholarship warns against (Hao, 2025; Mitchell, 2024; Rudolph et al., 2025). Following Lindgren (2024), who treats 'AI' as an empty signifier, we distinguish AI—the wider socio-technical assemblage of automation, algorithmic decision-making and datafication—from generative AI (GenAI), i.e., models that synthesise content such as large language and diffusion models. Used judiciously, "AI age" functions as an analytic convenience—not a total rupture—paired with scrutiny of who benefits, what is obscured, and whether practices are intentionally redesigned rather than merely rebranded. In what follows, most pedagogical claims target GenAI; when we mean the broader field, we say "AI" explicitly.

Our goal is to articulate a critical *and* constructive vision of good teaching in the AI age. We neither dismiss GenAI outright nor embrace it uncritically. Instead, we advocate a learning-centred use of GenAI: employ it where it demonstrably supports student learning and development, and resist uses that compromise academic integrity or sound pedagogy. We revisit core tenets of good teaching, show how GenAI challenges or reinforces them, and offer practical guidelines for educators and leaders to sustain pedagogical quality in an AI-saturated world.

Learning-centred teaching vs. techno-utopianism

A central message of *Teaching Well* is that good teaching is learning-centred, not teacher- or technology-centred. In practice, this means grounding our decisions in what helps students learn, rather than in what's trendy. It also means resisting the popular media 'hero teacher' trope (Brookfield et al., 2023) and, by extension, the fetish for shiny new tech tools for their own sake.

Overly optimistic narratives often portray AI as a *super-teacher* – an infallible tutor that can personalise learning perfectly or a saviour that will 'disrupt' all the old educational problems (Houser, 2025; Khan Academy, 2025; Selwyn, 2019). Such techno-utopianism risks substituting gadgetry for pedagogy. History counsels restraint: successive waves of 'revolutionary' EdTech—from correspondence courses and film to radio, television, early teaching machines, personal computers, the web, and dot-com e-learning—were routinely heralded as cure-alls yet yielded modest, uneven gains when divorced from pedagogy. Educational change has been more contingent than deterministic. We should resist both techno-fetishism and Luddism and insist on design-led implementation (Kefalaki et al., 2022).

As educators, we must resist the allure of ubiquitous metrification – the obsession with quantifiable metrics or algorithmic outputs as proxies for teaching quality (Brookfield et al., 2023). The efficacy of teaching cannot be fully captured by AI analytics or automated dashboards any more than it can by simplistic student evaluations. *Teaching Well* reminds us that higher education is inherently ideological and context-dependent, not a value-neutral input-output system.

In the AI age, maintaining a learning-centred focus requires critical context-setting whenever we use AI. A good teacher in 2025 will ask: 'How does this AI tool enhance my particular students' learning in this specific context?' Framed by Technological Pedagogical Content Knowledge (TPACK), that is a TK–PK–CK judgement anchored in Contextual Knowledge (XK) (Mishra, 2019; Mishra et al., 2023). If a generative AI tool can instantly produce an essay or solve a problem, a naive techno-optimist might declare the human teacher obsolete for those tasks. But an effective, context-aware teacher will instead consider how to integrate that tool to support learning—for instance, by using GenAI-generated answers as a starting point for critique, comparison, or deeper inquiry by students. A good teacher re-centres on learning objectives: what students should learn and how GenAI may advance—or impede—that learning.

This approach requires a shift from detection/prohibition to design in the face of GenAI (Perkins et al., 2025). Rather than asking, 'How do we stop students from using GenAI?' (a reactive stance focused on the technology), a learning-centred teacher asks 'How might students *productively use* GenAI in a way that still meets the intended outcomes?' – or conversely, 'How do we redesign the task if we truly need to ensure students *don't* use GenAI here?' These questions put learning first, technology second.

Good teaching has always involved meeting students where they are and guiding them forward. AI doesn't change that. If anything, today's classrooms are more diverse in experience and learning preferences than ever, and *Teaching Well* emphasises adapting to this diversity through multiple teaching modalities. Brookfield et al. (2023) recommend the rule of three – using at least three different instructional approaches or media in a class session – to sustain engagement. GenAI can be one modality in the mix (e.g. an AI-driven simulation or brainstorming activity), but never the only one. A class that only consists of students interacting with a Large Language Model (LLM), for example, would violate the spirit of responsive and inclusive pedagogies.

Moreover, *Teaching Well* underscores that building trusting relationships with students is key to establishing teacher credibility and a sense of community (Brookfield et al., 2023). In this context, kindness is not sentimentality but a rigorous pedagogical stance that sustains presence, belonging, and humane practice (Aspland & Fox, 2022; Aspland et al., 2024). Complementing this, *compassion*—what Tan (2022) terms the *heartware* of teaching (mindsight, attentive love, storytelling)—names the human(e) architecture of pedagogy. Trust, community, kindness, and compassion arise from human interactions—listening, responding to feedback, showing empathy and authenticity—and these cannot be automated. When institutions lean too heavily on AI (e.g., AI tutors or grading bots) without a clear human presence, student–teacher trust and connection can erode, and motivation may suffer; recent guidance emphasises keeping humans in the loop and foregrounding human-centred design for precisely these reasons (Luo, 2024).

Conversely, when used judiciously under a teacher's guidance, GenAI can offload routine work and free time for high-touch interactions with students (Rudolph et al., 2023; Waring, 2025). The presence of GenAI in higher education should prompt *more* emphasis on the human elements of teaching, not less. AI can assist with certain tasks, but it cannot genuinely care for people or build the mentorship bonds that great teachers do. Nor does AI think or understand; it is neither intelligent nor artificial, but mirrors human cognition, aims, and errors rather than originating its own (Crawford, 2021; Rudolph et al., 2025; Vallor, 2024). Accordingly, the teacher's role as facilitator, motivator, and ethical guide becomes even more critical (Selwyn, 2019), and AI compels us to revisit graduate attributes: privileging adaptive expertise, critical AI literacy, and evaluative judgement in profession-relevant, workplace-simulated tasks over routine reproduction (Waring, 2025).

A learning-centred, contextual approach recognises inequities and variations in how AI affects learners. Not all students have equal access to current GenAI models or equal proficiency in using them; some may over-rely on GenAI and struggle when it fails them, while others may be unfairly suspected of misconduct due to biased or error-prone detectors. A good teacher should make GenAI's limitations explicit, teach ethical and documented use, and avoid sole reliance on automated detection—for example, by triangulating with process evidence or brief oral checks. *Teaching Well* reminds us that pedagogy is always entangled with power dynamics and institutional constraints, which

can derail well-intentioned innovations (Brookfield et al., 2022, 2023).

AI is now entangled in these dynamics: it embeds corporate power and training-data bias. An educator committed to equity, therefore, has to critically evaluate outputs with students—for example, examining where an LLM's answer may reflect hidden biases or omit salient perspectives—rather than treating AI as an objective oracle. Holding a learning-centred, context-aware stance helps guard against AI evangelists' grandiose, uncritical claims (Rudolph et al., 2025). We position AI as a tool in the service of pedagogy, not an autonomous pedagogue.

Fostering critical thinking and reflection in an AI world

A hallmark of good teaching is cultivating students' critical thinking. As *Teaching Well* (Chapter 8) clarifies, critical thinking is not monolithic but a variety of practices across analytic logic, scientific reasoning, pragmatism, psychoanalytic inquiry, and critical theory (Brookfield et al., 2023). Crucially, it is not a mere 'doubting game' of disembodied rationalism: robust critical thinking engages affective and cultural dimensions, questions one's own assumptions, and takes shape differently across Western and non-Western traditions (Brookfield et al., 2023).

Why is this relevant to AI? Because generative systems excel at surface fluency—mimicking argumentative structure without cultivating the habits of mind that critical thinking requires. Over-reliance on such tools can erode critical thinking, independent analysis and problem-solving (Kasneci et al., 2023; Popenici et al., 2023). If an LLM can draft a passable essay or solution in minutes, some students may accept it uncritically, short-circuiting their own cognitive engagement. Our task, therefore, is to design for agency: keep students in the driver's seat of inquiry—even as AI sits in the passenger seat—and use AI outputs as objects to critique, compare, or extend, rather than as substitutes for thinking.

One approach is to make a critical evaluation of GenAI outputs a learning exercise. Rather than prohibiting GenAI outright, a teacher might ask students to critique an LLM-generated essay or verify the sources and accuracy of a GenAI-produced answer, thereby positioning GenAI as an object of analysis rather than a proxy for student thinking.

Such strategies use GenAI as a tool for inquiry—prompting students to verify information, compare perspectives, and synthesise revised answers with their own reasoning. The goal is to ensure students practise the process of reasoning, not merely consume correct outputs. For example, an assignment can require students to (1) prompt an LLM for an initial idea on a complex question, (2) conduct independent research to support or refute that idea, and (3) reflect on how interacting with the system shaped their understanding. In this way, GenAI becomes a catalyst for metacognitive reflection rather than a substitute for thought: students must think about thinking, including GenAI's 'thought' process.

Teaching Well also underscores the importance of critical reflection for students and teachers (Chapter 10): questioning assumptions and viewing practice through multiple lenses—students' eyes, autobiography, peers, and theory (Brookfield, 2017; Brookfield et al., 2023). In a pervasive GenAI environment, new assumptions warrant scrutiny, notably that technology is right or neutral. Teaching students to critique AI aligns with teaching them to critically evaluate sources, authorities, and their own initial beliefs—a continuation of the age-old educational aim to cultivate independent, sceptical, yet open-minded thinkers. Indeed, learning with AI can foster epistemic humility: students quickly see that fluent systems can be wrong or biased, prompting fact-checking and consideration of alternative viewpoints—classic critical-thinking behaviours.

On the instructor's side, AI demands intensified critical reflection on our teaching practice. As *Teaching Well* argues, good teaching means continually examining our pedagogical assumptions and remaining open to change. GenAI compels us to rethink long-standing assessment routines, such as the essay, as the automatic 'gold standard'. If what we care about is argumentation or critique, we might evidence it more validly through oral defences, annotated evidence trails, or partial-AI work with a short rationale. Critical reflection may reveal that some traditional tasks were due for renewal irrespective of GenAI, while others (e.g., in-class debates, viva-style examinations) gain renewed value. The point is not to respond out of alarmism or fad, but through inquiry into how design choices affect learning. Teaching in a critically reflective key keeps us open to change and experimentation rather than drifting onto automatic pilot. GenAI is a test case for that stance, requiring judicious experimentation coupled with rigorous evaluation of impact on learners.

Good teaching in the AI age recommits to critical thinking and reflection—both in what we ask students to do and in how we ourselves adapt. We should design learning so that students critically evaluate GenAI outputs rather than accept them, and we should exercise professional judgement about when and how AI belongs in our pedagogy. In doing so, AI remains a means to the timeless end of cultivating thoughtful, informed, critically engaged learners, rather than a shortcut that undermines that very goal.

Teachers as lifelong learners

Another key theme from *Teaching Well* (especially Chapter 13) is that good teachers are lifelong learners. In the journey of a teaching career, one does not 'arrive' at perfection; rather, teachers evolve by reflecting on experience, learning new skills, and even learning from failures. Brookfield et al. argue that while we improve our technical repertoire over time, what truly keeps teachers effective is learning in other dimensions – *politically, ontologically, somatically, and emotionally (POSE)*. To stay engaged and teach well, we must learn how to navigate institutional politics and advocate for good practices (political learning), how to re-examine our identity and purpose as educators (ontological learning), how to listen to our bodies and manage stress (somatic learning), and how to handle the emotional rollercoaster of teaching (emotional learning). These forms of professional

growth go far beyond the latest tech tool. They cultivate resilience and adaptability – traits that are indispensable in the current AI-driven upheaval.

When GenAI appeared seemingly overnight (the release of ChatGPT in late 2022 stunned many by showing GenAI could perform tasks traditionally used for assessment (Mills et al., 2023)), it was a jarring experience for educators. Yet, the shock and uncertainty surrounding GenAI is not unprecedented. It marks another inflection point in the long journey of pedagogical adaptation to change. Those teachers who have cultivated the habit of learning by doing and 'failing well' were better positioned to respond constructively (Brookfield et al., 2023, 2024). For example, early adopters of AI in their teaching trialled small changes: for example, redesigning an assessment by adding a brief AI-use reflection journal. Not all experiments succeeded, but the cycle of trying, observing, and iterating is how practice improves—and collegial sharing accelerates that learning. Many institutions stumbled in their early responses to AI and assessment. Those missteps nonetheless seeded refinement and better practice. Imperfect, proactive action proved preferable to inertia because it catalysed the discourse and subsequent improvements (Perkins et al., 2025).

A critical aspect of teachers' continuous learning today is precisely learning about AI ——when, why, and whether to use it. This is where the *political and ontological* facets of learning matter. Politically, teachers need to engage in institutional decision-making about AI (for example, contributing to course-level policy or advising on academic-integrity strategies). It is important that teacher voices guide these policies because when teachers step into leadership roles, they must carry forward the insights of classroom practice (Brookfield et al., 2023). Yet some educational leaders are swept up in AI evangelism or, conversely, AI paranoia, and lose sight of pedagogical fundamentals. Sector guidance cautions against one-size-fits-all responses to GenAI—whether blanket prohibitions or rapid, top-down tool adoption without consultation and staff development—because such approaches are unlikely to be pedagogically workable in classrooms (Cassidy, 2023; Lodge et al., 2023; Perkins et al., 2025).

The notion of *learning leadership* is pertinent here: it treats leadership as distributed and 'from below', oriented on helping others learn while we ourselves continue learning (Brookfield et al., 2023; Preskill & Brookfield, 2009; Preskill et al., 2023). Applied to AI, a learning-oriented leader, for instance, convenes faculty forums on AI's impacts, learns from teachers' experiences on the ground, and pilots and evaluates policies before scaling. Such learning leadership also questions assumptions (for example, that GenAI-detection tools will resolve academic integrity concerns) and fosters communities of practice rather than imposing top-down mandates. More broadly, AI integration should be approached as a shared learning process in which teachers, professional staff, administrators, and students act as learning partners.

Ontologically, the rise of AI challenges us to rethink our identity as teachers. If one's self-concept as a teacher rested on being the 'sage on the stage', the advent of LLMs capable of generating answers, exemplars, feedback, and code with convincing fluency (but without understanding) can unsettle that stance and induce a mini-identity crisis. Long before GenAI, in 1970, Paulo Freire (2000) discredited the 'banking' model of education—teaching as one-way deposit and withdrawal—and argued instead for learners as co-creators of knowledge. *Teaching Well* reminds us that what matters most is not the volume of content we transmit but the forms of learning we model and facilitate—intellectual curiosity, ethical reasoning, empathy, and judicious inquiry. These are aspects of our teaching selves that AI cannot authentically enact. Teachers may therefore relinquish the role of sole answer-giver and adopt the roles of a 'guide by the side'—coach, facilitator, mentor, and designer of learning. That shift long predates AI; GenAI simply gives it fresh urgency.
Yet, teachers are far from obsolete. On the contrary, our responsibilities in helping students make sense of knowledge, discern truth, and develop as whole persons are more vital than ever in the AI age. The identities of the good teacher are thus evolving, not diminishing. We can take heart in the fact that the dispositions we cultivate—curiosity, integrity, compassion, adaptability—are exactly what learners need to navigate a world saturated with AI. In this sense, we, too, remain learners, figuring out how to navigate a new landscape. We need not have all the answers. What's important is remaining committed to the underlying mission of higher education and being willing to learn new tools and methods to advance it.

Good teaching in the AI age still implies teachers who are learning and growing. We continue to reflect, experiment, and collaborate with peers, remaining open to change while anchored in educational values. AI will not replace great teachers, but there is a legitimate concern that institutions may be tempted to deploy it as a cost-cutting substitute (Rudolph et al., 2023; Selwyn, 2019). Crises in higher education are often leveraged to justify managerial 'efficiencies' and austerity—"never let a good crisis go to waste" (Fleming et al., 2021)—so AI policy deserves the same scrutiny (Tan et al., 2024). The antidote is active, evidence-informed engagement: learn about AI, shape its use through sound pedagogy, and assert the educator's irreplaceable role. In doing so, we not only use AI judiciously but also teach through and about AI, extending our repertoire. Thus, good teaching—rooted in human connection and professional judgement—remains the cornerstone of learning, however capable the tools become.

Rethinking assessment: From cheating panic to authentic design

Assessment should evidence what students are intended to learn, not merely what is convenient to test. Final examinations and multiple-choice tests are rarely authentic (Biggs et al., 2019; Brookfield et al., 2023). More broadly, constructive alignment asks us to declare the intended outcomes as verbs, design teaching and learning activities that elicit those verbs, and judge performance against transparent standards rather than a Bell curve (Biggs et al., 2019; Biggs & Tang, 2011). Students learn what is assessed. Thus, the remedy for mismatches between curriculum and assessment is to align tasks with the outcomes we actually

value—argumentation, critique, problem-solving, design, communication—rather than rely on proxies (Biggs et al., 2019; Biggs & Tang, 2011). The AI era does not overturn these principles. It sharpens them, making it even more important to specify the construct, set appropriate conditions, and gather evidence that students can use knowledge in academically and professionally appropriate ways.

Among pedagogical practices, assessment has been the most immediate locus of GenAI's disruption. Assessments such as take-home essays, case analyses, and coding exercises can now be partially or wholly automated, provoking what many described as an *assessment crisis* (Lodge et al., 2023; U.S. Department of Education, 2023). From late 2022, early institutional responses towards GenAI tools like ChatGPT tended towards restrictive, surveillance-oriented measures, with closed-book, in-person examinations (a return to pen-and-paper), blanket prohibitions, and growing reliance on detection tools rather than task redesign (Cassidy, 2023; Chaka, 2023; UNESCO, 2023).

Many instructors quickly found that current AI-detection software is unreliable—prone to false positives and demographic bias, and easily evaded (Chaka, 2024; Perkins et al., 2024; Sadasivan et al., 2024; Weber-Wulff et al., 2023). In hindsight, these reactions are understandable—the terrain of academic integrity shifted almost overnight—but they are not sustainable as long-term solutions. We should be less preoccupied with catching cheaters and more concerned with whether our assessments are valid measures of learning (Dawson et al., 2024). GenAI is an opportunity to confront long-standing weaknesses in assessment design that are now plainly visible.

One constructive response has been the development of GenAI assessment scales. Rather than policing use, Perkins et al.'s (2025) AI Assessment Scale (AIAS) treats GenAI as a design variable to be specified alongside outcomes, conditions, evidence, and criteria. The AIAS aligns the permitted level of GenAI use in a task with the task's intended outcomes and conditions, replacing binary rules (AI allowed/not allowed) with a design framework. In its updated form, the scale offers five non-hierarchical levels—No AI (Level 1), AI Planning (Level 2), AI Collaboration (Level 3), Full AI (Level 4), and AI Exploration (Level 5)—with no level intrinsically 'better'; selection is outcome-led. Where the purpose is to evidence independent writing or problem-solving, a No AI (Level 1) task under appropriate conditions is warranted. Where the goal is to develop students' ability to work with AI (e.g., in research workflows), a higher level (e.g., AI Collaboration or Full AI) can require students to use AI and then document, critique, and build upon its contributions in line with the learning outcomes.

The strength of the AIAS is that it requires intentional assessment design rather than reactive policy. As Perkins et al. (2025) caution, simply labelling a take-home task 'No AI' without redesigning its conditions, evidence, and criteria is largely unenforceable and risks devolving into performance theatre. Students may sign declarations while covert use persists, leaving staff either unaware or chasing detections. Validity and security erode because policy and task are misaligned. Everyone is pretending AI isn't there when it is. This is the very definition of a performative, uncritical response to AI: a policy on paper with no real impact on learning.

The opposite error is performative embrace: re-badging a legacy assignment as "Level 4: Full AI" without adapting rubrics, process evidence, or support, thereby confusing expectations and allowing students to lean on AI in ways that mask learning—a false sense of knowledge creation. Both extremes—knee-jerk prohibition and uncritical integration—should be avoided. The remedy is design-led alignment of outcomes, conditions, evidence, and criteria (Perkins et al., 2025).

In practice, a thoughtful approach to AI-era assessment begins with design, not detection: build tasks that make learning visible through intermediate artefacts, drafts, short oral checks, and brief reflective justifications, and avoid high-stakes reliance on error-prone detectors (Chaka, 2024; Dawson et al., 2024; U.S. Department of Education, 2023; UNESCO, 2023). Second, specify permitted AI use in line with outcomes and conditions. State up front what you are assessing and align the task design accordingly: if the target is independence, require 'No AI' under authenticated conditions; if the intended outcome is working with AI, permit its use and require evidence and rationale, in line with the AIAS framework (Lodge et al., 2023; Perkins et al., 2025).

Third, assess judgment and voice, not just answers. Adjust criteria to credit how students select, verify, adapt, attribute, and add voice to AI-mediated work, drawing on the literature on evaluative judgement (Bearman et al., 2024). Fourth, sequence evidence across time and modes to strengthen validity: combine brief in-class no-AI writing, an AI-assisted draft with commentary, and an oral defence, aligning with programme-level assessment principles (van der Vleuten et al., 2012; Perkins et al., 2025). By sequencing and mixing modes (written, oral, in-class, take-home), we get a fuller picture of student capability and discourage overreliance on any one tool. Finally, plan for equitable access and teach critical AI literacy: guarantee access to approved tools, teach their limitations and ethics, state clear boundaries for permitted versus prohibited functions, and spell out reasonable adjustments for accessibility tools that use AI (e.g., screen readers, speech-to-text), so that access needs are met without undermining the assessment construct (OECD, 2023; Rudolph et al., 2025; UNESCO, 2023; U.S. Department of Education, 2023; Waring, 2024).

Conclusion

Good teaching in the AI era remains anchored in distinctly human work: contextual responsiveness, critical thinking, ethical judgement, and relationships that sustain learning (Brookfield et al., 2023). Our position has been deliberately critical and constructive. We cautioned against both techno-optimism and performative panic, and argued instead for design-led responses—especially in assessment—so that what we value is what we actually elicit and judge. In practice, this means treating GenAI as a design variable (not a policing problem): make learning visible, specify permitted

use in line with outcomes and conditions, and evaluate students' judgement, not just their answers (Perkins et al., 2025). It also means stepping back from a narrow fixation on 'catching' misuse and returning validity to the centre of assessment conversations (Dawson et al., 2024).

Looking ahead, our call is simple but exacting. First, teach from principles: keep *Teaching Well*'s commitments in view—democratisation, critical reflection, humane pedagogy—and let those principles govern where AI belongs and where it does not. Second, redesign with evidence: pilot, evaluate, and share what works, rather than imposing blanket bans or tool mandates. Third, keep the human in the loop: kindness, compassion, and professional judgement cannot be automated; they must frame every AI decision we make. Good teaching in the AI age is neither nostalgic nor credulous. It is the steady, sceptical, and hopeful craft of educators who learn, design, and lead so that technology remains a means, not a master. The end—thoughtful, informed, critically engaged graduates—stays firmly in view.

Highlights of Issue 8(2)

The issue of 8(2) provides a diverse mix of studies, reflections, and reviews that echo, in different ways, our central question: what does it mean to 'teach well' in the AI age? Some of the articles take AI head-on—looking at its influence on student engagement (Ala and co-authors), the impact of GenAI information quality and adoption (Essien and co-authors), the risks it poses to critical thinking (Mohammadkarimi & Omar), and the factors shaping students' perceptions, acceptance, and adoption of GenAI tools (Stroud & Du). Other pieces explore its pedagogical and ethical implications—from the integration of large language models into language classrooms to co-created (Xu), culturally relevant assessment frameworks for teacher education (Naidu & Sevnarayan), and even broader digital transformations through metaverse and 'second life' learning environments (Tegoan and co-authors). Perkins and co-authors' commentary on the AI Assessment Scale (AIAS) is especially provocative, which reminds us that simply labelling or detecting AI use is no substitute for designing assessments that foster judgement, voice, and equity.

Not every contribution is about AI, and that's important. Other articles take us back to enduring concerns: how students experience the hidden costs of academic conventions such as the APA referencing style (Goegan & Roberts); how soft skills are cultivated through work placements (Mikrut & Collins); how simulations create engagement and flow in management education (Zhang & Choi); and how institutions and learners alike navigate sustainability and learning dynamics across different higher education models (Liu and co-authors). These bring to mind that questions of motivation, integrity, and development remain at the heart of teaching—whether or not AI is in the room.

We also have pieces that stretch the boundaries of what counts as scholarship in refreshing ways. An opinion piece uses BTS songs to spark new thinking about services marketing pedagogy (Noor), whilst book reviews bring critical perspectives on multilingual education (Tang), learning resources (Waresindo & Rohmatulloh), critical management studies (Rudolph), and even how academics themselves might approach AI in writing and research (Rohmatulloh & Winarni). Taken together, these contributions do not give us a single answer to 'good teaching', but they do show us the richness of the conversation when numerous voices and approaches are in play. Reading across this issue, we are struck by how the real question isn't whether we should use AI, but how we teach well with and around it.

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How (not) to use the AI Assessment Scale

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Abstract

The rapid uptake of generative AI (GenAI) has exposed weaknesses in assessment design and policy. The AI Assessment Scale (AIAS) offers a practical way to align permitted AI use with intended learning outcomes. However, as the scale has grown, we have seen implementations that we feel could be improved: unenforceable 'No AI' labels, assigning labels to existing assessments without changing the assessments themselves, equity blind spots, and control-first policies that encourage 'performance theatre'.

This commentary outlines our recommendations for AIAS implementations that replace detection with design: selecting levels by outcome and conditions, requiring light process evidence where suitable, adjusting criteria to assess judgement and voice, sequencing evidence across time, and planning for equitable access. We highlight sector-specific considerations for implementing and adapting the AIAS for K-12, higher education, Technical and Vocational Education and Training (TVET), English as a Foreign Language (EFL), and English for Academic Purposes (EAP).

Keywords: AI Assessment Scale (AIAS); assessment design; educational assessment; Generative AI; validity.

Introduction

Educators need a clear way to design valid assessments in a GenAI-saturated world, and one way this has been achieved is through the AI Assessment Scale (AIAS) (Perkins, Furze, et al., 2024; Perkins, Roe, & Furze, 2024). This commentary does three things. First, it describes the most common ways in which the AIAS has been unintentionally misused or applied. Second, we suggest how the AIAS can be effectively applied to support GenAI integration into assessments. Finally, we offer suggestions as to how this might be done in K-12, higher education (HE), and Technical and Vocational Education and Training (TVET), so that readers can adapt the approach to their context.

The AIAS began as a practical response to a specific moment. In early 2023, Australian media reported that the Group of Eight universities were reverting to pen-and-paper examinations to counter the use of GenAI tools such as ChatGPT by students in open assessments (Cassidy, 2023). At this point, the authors recognised the need for an alternative approach to assessment that was more sustainable and equitable than reverting entirely to end of unit examinations. With this in mind, Leon Furze drafted an initial framework to move discussions away from blanket bans and toward design choices recognising the possibility of GenAI integration into assessment practices (Furze, 2023). Through collaboration with Mike Perkins, Jasper Roe, and Jason MacVaugh, we refined the early sketch into a more structured model and circulated a preprint of the AIAS in December 2023 to help educators act during what felt like an assessment emergency (Perkins et al., 2023).

By the time the AIAS was published in the *Journal of University Learning & Teaching Practice* in April 2024 (Perkins, Furze, et al., 2024), the assessment landscape had already shifted. Evidence has been accumulating about the fallibility of AI text detectors, with significant false positives and bias risks that make them unsuitable for high-stakes decisions (Chaka, 2023, 2024; Perkins, Roe, Postma, et al., 2024; Perkins, Roe, Vu, et al., 2024; Sadasivan et al., 2024; Weber-Wulff et al., 2023). Our original version of the scale implied the use of detector checks as a control mechanism at earlier levels, which we recognised was neither a reliable nor an educationally useful approach for summative assessment. We concluded that the scale should not depend on technologies that cannot accurately demonstrate who wrote what, and that further adjustment was needed. We recognised growing calls for assessment redesign in the GenAI era, moving away from concepts of detection and policing, and more towards supporting instructors to develop valid assessments for the

age of GenAI (Bearman et al., 2024; Lodge, Howard, et al., 2023). These concerns sit within longer-standing plagiarism typologies that predate GenAI, including complex forms of plagiarism that evade simple detection (Perkins et al., 2019). Recognising that having valid assessments may matter more than concerns of student cheating (Dawson et al., 2024), especially in the uncertain times that the education sector was facing, we drew on a Vygotskian view of learning (Vygotsky, 1978) to redevelop the AIAS. Using the perspective of GenAI as a cultural tool that may mediate knowledge construction when used by students, as a scaffold to help students achieve more than they would otherwise be able to do within their Zone of Proximal Development (ZPD), we were able to separate two questions that are often conflated. First, what do we want students to be able to do unaided here and now? Second, how do we want them to use and evaluate GenAI tools as part of their authentic practice?

We refocused on developing the AIAS to do both, and when considered from this perspective, it avoids the trap of being a purely discursive approach (Corbin, Dawson, et al., 2025) by giving staff and students a shared language for permitted use in a given task and acting as a scaffold for educators to redevelop and redesign assessments. This rebalancing toward judgement and critique aligns with evidence that GenAI can support, but should not replace, learner agency (Roe & Perkins, 2024a). From this perspective, we adjusted the model, moving to five non-hierarchical levels: 'No AI' (Level 1), 'AI Planning' (Level 2), 'AI Collaboration' (Level 3), 'Full AI' (Level 4), and 'AI Exploration' (Level 5). The updated AIAS is shown in Figure 1.

The AI Assessment Scale

1	NO AI	The assessment is completed entirely without AI assistance in a controlled environment, ensuring that students rely solely on their existing knowledge, understanding, and skills **You must not use AI at any point during the assessment. You must demonstrate your core skills and knowledge.**
2	AI PLANNING	AI may be used for pre-task activities such as brainstorming, outlining and initial research. This level focuses on the effective use of AI for planning, synthesis, and ideation, but assessments should emphasise the ability to develop and refine these ideas independently. **You may use AI for planning, idea development, and research. Your final submission should show how you have developed and refined these ideas.**
3	AI COLLABORATION	AI may be used to help complete the task, including idea generation, drafting, feedback, and refinement. Students should critically evaluate and modify the AI suggested outputs, demonstrating their understanding. **You may use AI to assist with specific tasks such as drafting text, refining and evaluating your work. You must critically evaluate and modify any AI-generated content you use.**
4	FULL AI	AI may be used to complete any elements of the task, with students directing AI to achieve the assessment goals. Assessments at this level may also require engagement with AI to achieve goals and solve problems. **You may use AI extensively throughout your work either as you wish, or as specifically directed in your assessment. Focus on directing AI to achieve your goals while demonstrating your critical thinking.**
5	AI EXPLORATION	AI is used creatively to enhance problem-solving, generate novel insights, or develop innovative solutions to solve problems. Students and educators co-design assessments to explore unique AI applications within the field of study. **You should use AI creatively to solve the task, potentially co-designing new approaches with your instructor.**

Figure 1. The Updated AIAS.

The AIAS has been widely adopted in K-12 (Furze, Perkins, & Roe, 2024) and HE (Furze, Perkins, Roe, et al., 2024) contexts, as well as in TVET (Riis, 2025). Ongoing research is being carried out across the globe on the potential that this has to support learners and educators in adapting to this 'wicked problem' (Corbin, Bearman, et al., 2025). To date, we are aware of more than 350 institutions using the scale in one form or another. It has been translated into over 30 languages, cited in policy and course documentation across multiple systems, and has received recognition from organisations around the globe as a method of supporting academic integrity (Studiosity, 2024, 2025) and noted by educational regulators such as the Australian Tertiary Education Quality and Standards Agency as an option to assist with implementing GenAI into assessment (Lodge, 2024).

This commentary builds on our experiences discussing AIAS implementations with educators and administrators worldwide by describing some of the most common ways in which we have seen the AIAS used in ways that do not necessarily support assessment validity or task redesign. The aim of this is not to criticise; in our view, doing something and proactively taking control is better than doing nothing at all. Early users of the AIAS have contributed to the development of the discourse surrounding GenAI in assessment and provided direction for refining the scale. Those institutions that tried to do something, rather than ignoring the challenges of GenAI, have acted as trailblazers for other, perhaps more cautious institutions to follow in their footsteps. Our purpose is to help others learn from their actions and outline what effective implementation looks like when the scale is used as both a redesign framework and communication device.

Second, we offer suggestions and advice based on our collective work with institutions worldwide to guide future implementations of the AIAS and highlight what should be considered before doing so. Finally, we discuss how AIAS implementations may need to be adapted when carried out across a variety of contexts, including K-12, HE, TVET, and in English as a foreign language (EFL) and English for academic practice (EAP). All these contexts have different needs, regulatory environments, and unique challenges for assessment which need to be addressed in unique ways.

In all cases, the fundamental challenge for implementing GenAI in assessment remains the same: if the task and its conditions do not change despite the introduction of GenAI as a tool which can be used by students (illicitly or not), then challenges with assessment validity will occur. We hope to demonstrate how institutions can avoid integrating GenAI into assessment without it becoming either an example of 'security theatre' which is swiftly ignored by students, leading to academic integrity concerns, or worse, pretending that students can demonstrate their mastery of learning outcomes just as well with GenAI compared to without it, leading to a false sense of knowledge creation.

How *not* to use the AIAS

One of the key affordances of the AIAS is its flexibility and ability to be tailored to meet a wide range of assessment tasks in multiple educational contexts. That said, there are several areas that users should be aware of when seeking to implement the AIAS, which have mainly come to light since the original release of the first iteration of the scale. In this section, we reflect on some of the ways that the AIAS could be used inappropriately or in a way that does not support effective, valid assessment.

When can it really be 'No AI'?

The first major misconception is that the AIAS can be used to label an existing assessment without considering the possibility of enforcement. For example, we have seen in some cases educators labelling take-home essays as 'No AI'. In an unsecured essay assessment, there is no realistic way to ensure that no AI technologies are used throughout the process. It is understandable that some educators will wish to take this approach; after all, many conversations we have had suggest that educators wish they could go back to the 'old days' when they only had to worry about contract cheating, collusion, or other forms of misconduct, rather than wrap their heads around what AI means for these concepts. This is impossible because there are no accurate ways to detect the use of AI in written work with current technologies, and it seems unlikely that any will emerge in the future. For every detection technology, there will quickly arise a way around it, whether that is high tech (a new model which is less detectable, as we saw from GPT-3 to GPT-4) or low tech (copying and pasting different passages, manipulating AI text to sound more 'human'). This is something we have written about prior to the public release of ChatGPT or other GenAI models. In 2022, we claimed that Automated Paraphrasing Tool (APT) detection and evasion constituted an arms race of development and evasion which ultimately is a zero-sum game and benefits neither teachers nor learners (Roe & Perkins, 2022).

Using this kind of approach ultimately creates conditions that are purely performative: students may declare 'No AI', teachers may believe 'No AI', yet the assessment is both invalid and insecure. Operating assessments in this way, with no adjustment to structural changes, has been referred to as a 'discursive' approach to assessment redesign in the AI era (Corbin, Dawson, et al., 2025) and is not an option we recommend.

Ultimately, we feel that programmes of study should often (and in some cases must) contain 'No AI' assessments, but that these need to be practical and pragmatic. Dawson (2020) states that assessment security must contain authentication (an assurance that the student is the person who completed the work and not someone else) and control of circumstances (the assessment must be taken under specific conditions). This does not mean that 'No AI' assessments must only be proctored examinations or oral viva voces, however. There are multiple other options in which these conditions of assurance and control of circumstances can be met; for example, in-class discussions, debates, or informal moments

of technology-free interactions are all assessable materials. Where higher-order outcomes are the target, it is more credible to surface student decision-making about tool use than to attempt blanket prohibition (Roe & Perkins, 2024b).

AI for AI's sake

By that, we mean that an assessment is suddenly upgraded to 'Full AI' without due consideration for what this means for students being able to demonstrate the learning objectives of the task.

A change introducing GenAI technologies fundamentally alters the conditions, outcomes, and meaning of any assessment, and doing this without considering the resulting changes in learning does no favours to the learner or the assessor. Changing assessments to 'Full AI' or 'AI Exploration' needs to involve a major redesign of the task to account for the assistance provided by GenAI tools and not just be a way to avoid engaging with the concept of academic dishonesty or inappropriate use of AI by students. We believe it is better to engage with AI and enable or advocate for its use where it adds value in a way that has external validity, that is, it is how AI would be used in a target domain outside of the programme of education, rather than adding AI for AI's sake.

Retrofit without redesign

Both issues fall into the trap of attempting to retrofit AIAS levels to the assessment task without considering the context in which it is being carried out. We are aware that assessment design is difficult, time-consuming, and requires significant bureaucratic considerations in some contexts (i.e. plans for assessment needing to be submitted several months or even years in advance). In these cases, it might be tempting for educators to just assign an AIAS level ('Okay, you can use Level 3 in this task...') without making any changes to the assessment brief, rubric, or student guidance. In relation to this, we see the AIAS primarily as an assessment *design* tool, not an assessment security tool. For the reasons explained elsewhere in this commentary, it is not possible or fair to simply label a task at a given level of the AIAS and then hope that students will comply with it. If you permit GenAI, redesign the brief, evidence trail, and rubric to grade students' decisions, checks, and justifications, not just their ability to push buttons.

Equity and inclusion

AI use is divisive; some educators seem to embrace it fully and look toward a near-future in which AI is part and parcel of our everyday lives (for many of us, it already is, whether we know it or not). Others actively resist the incursion of AI and its use in education on moral, ethical, environmental, and other grounds. These concerns are valid, but we do not see active AI resistance as a tenable option as long as AI tools are publicly accessible to learners. The reason that this matters, and we advocate for using the AIAS (even if you are an AI resistor), is to ensure that assessment is valid and fair, but also to ensure equity as far as is possible.

Ignoring GenAI risks inequity and invalid results. Just as some educators are heavier users of AI, some students are more willing, capable, and able to experiment and pay for premium or advanced AI tools. One way that we can address this is to try and ensure that if we design a 'Full AI' assessment, we are prepared for the fact that some learners may be better resourced than others if we are not providing access to the most up-to-date technology (a student with paid access to the very latest model by OpenAI, Claude, or Gemini may have a significant advantage compared to a student using the equivalent free model). Likewise, if we are discursively claiming that a take-home task is 'No AI', and relying on text detection technology to enforce this, those students who have access to the most advanced models and are able to use AI humanising tools to manipulate the resulting output will go undetected, gaining an unfair advantage over their peers.

Furthermore, we must consider the overall assessment approaches taken in the context of the module or programme. As mentioned, some educators take different stances on AI use in their teaching and assessment strategies. If a module is changed from year to year with a different instructor, perhaps from one who allows AI use in assessment to one who does not, then this negatively affects score validity and creates fairness issues across programmes. This effect may be multiplied when this happens on a section-by-section basis; we feel strongly that AI assessment policies should be standardised as much as possible within one module or unit to ensure that fairness and equity are maintained.

Flexible not fixed

We are grateful for the support, interest, and debate generated by the AIAS. At the time of the first release, it was the best option we could offer to deal with the disruption GenAI created in our professions. Since then, new approaches to integrating GenAI in assessments, such as the two-lane approach (Liu & Bridgeman, 2023), new technologies such as agentic AI, and shifts in our thinking have shaped its evolution. In response, we refined and developed the framework collaboratively with input from many other scholars.

We do not claim to know every context. This is why we published the AIAS under a Creative Commons licence and encouraged adaptation, remixing, and alteration of the scale to suit different contexts and assessment types. As a result, we have seen many different ways of utilising the AIAS across programmes, levels of education, and cultural contexts. Some of these seem to us more intuitive and practical than others, but we are always supportive of any attempts to use the AIAS to try and ensure equitable and valid assessment. If the current form does not fit, keep the principle of redesigning assessment for a new GenAI reality and create something that works for you.

For us, the levels of the AIAS are not prescriptive; they are guiding. For example, we frequently receive questions asking specifically what the difference is between a Level 3 and a Level 4 assessment task, or between a Level 4 and a Level 5 task. However, we believe that the interpretation

of this is up to individual educators, and finer distinctions can be co-defined by the educator, institution, and learner. We do not see the levels of the AIAS as a rigid structure that must be adhered to, but as ways of thinking about how assessment can be reconfigured to support the assessment of and for learning that can be adapted and altered to suit the on-the-ground conditions.

Implementation suggestions

This section offers general tips and advice based on our collective work with schools, universities, businesses, and education providers worldwide. As with the rest of this commentary, it is not offered as a hard-and-fast set of rules, but as examples of things that we have found work in practice to support effective assessment, as well as things to avoid.

Focus on the faculties

We have found that working at the subject, discipline, and faculty levels is the most successful approach to implementing the AIAS in an institution. 'Leading from the middle' is an effective way to disseminate training and professional learning in schools (Lipscombe et al., 2023) and makes sense when working with GenAI as it is highly contextual for each discipline: what GenAI tools mean to assessments set by an English teacher is very different to the mathematical reasoning implications of the same model used in a Maths or Science classroom.
This is important because each field has unique relationships with how text production, problem-solving, and creative outputs are valued and used, and these discipline-specific needs cannot be addressed through generic, institution-wide policies alone. Working at the faculty level with groups of subject-matter experts allows for the development of assessments that can maintain disciplinary integrity in technology integration.

Before using the AIAS

Before faculties begin to work with the AIAS, we recommend an honest discussion about the overall validity of their current assessments. In many contexts, particularly senior secondary and HE, there has been a drift towards high-stakes examination-style assessments for most or all formally graded outcomes as GenAI usage has become more widespread. We consider this approach to lack validity because these 'secure' assessments are not inclusive or accessible (Dawson, 2022). Frank conversations in faculty meetings about whether existing assessments are valid should precede any consideration of GenAI's implications.

Content validity (are we really assessing what we have taught?) and construct validity (does this assessment measure the intended knowledge and skills?) are also important considerations before worrying about GenAI. We need to be clear on whether our existing assessments achieve the outcomes we are looking for. Again, examinations are a good example: while they are a secure Level 1 type of assessment, they may not be the best way to judge a student's capabilities in all topics or disciplines.

Determining the role of GenAI in learning

When considering GenAI integration, educators should evaluate whether the technology being discussed helps or harms the learning objectives. The key question becomes: 'Is it a bad use of the technology, or a bad use of your brain?' If the answer to either of these questions is '' yes, then there is a strong chance that a Level 1 task might be necessary. Otherwise, Levels 2-5 of the AIAS can be explored as options. Faculty discussions should address whether the skills or knowledge being assessed might be too easily offloaded to GenAI, and what mitigation strategies might be needed. However, automatic assumptions that all AI use by students in assessments constitutes 'cheating' should be avoided.

While certain skills may be diminished by GenAI use, we urge faculties to consider which skills might be 'let go'. Historically, we have seen this happen many times: GPS replacing map-reading skills, the calculator offsetting the need for mental arithmetic (Lodge, Yang, et al., 2023). GenAI will potentially lead to some skill loss, and it is too early to determine exactly what that will look like. As disciplinary experts, educators must judge which subject-specific skills and knowledge need to be retained and which can, in some ways, be supported by AI tools.

Choosing the right level for each task

Finally, selecting an appropriate level for a task is important. We say 'task' because summative assessment should be broken down into multiple points of assessment over time to support validity, rather than being conducted as a single high-stakes end-of-unit test. (Dawson et al., 2024; van der Vleuten et al., 2012). At the start of a unit, it might make sense to have an informal Level 1 task, such as an observed group discussion, to benchmark students' initial understanding of a topic. Research tasks can be conducted using GenAI 'Deep Research' tools (Level 2). A Level 1 draft written in class might be used as a link in the evidence chain to authenticate a later (Level 3) GenAI-edited final version. In some cases, Level 4 or 5 might be the best choice because an open and unrestricted use of AI best reflects the reality of how students will be expected to interact with the technology outside of education. Equity is a key consideration here: if a task *requires* students to use GenAI tools to complete it, guarantee access to free tools. If Level 1 is used, accommodations for any assistive technology that involves AI must be explicit, distinguishing it from AI that would compromise validity.

Overall, we support educators' autonomy and professionalism in deciding where GenAI should and should not be used. These decisions must be made with eyes wide open about the technology, not on assumptions or personal preference, and they should be made with students in open, transparent conversations that explain why the level was chosen, what AI uses are permitted or prohibited, what evidence and disclosure are required, and what access and

accommodations are in place.

Contextual variations matter

The AIAS authors teach across diverse contexts, including HE, K-12, adult education, TVET, and EAP/ EFL. The AIAS has also been applied in business settings for corporate learning and development purposes. Given the vast differences between educational contexts across jurisdictions, the AIAS requires a flexible application.

Since we first published the original AIAS, we have created permissively licenced CC-BY-NC-SA 4.0 documents available on aiassessmentscale.com and published in open-access journals, an approach which has allowed the broad education community to adapt and remix the ideas of the AIAS. The following sections describe how we suggest the AIAS could be applied in the different sectors we work in, both through our teaching and through the advisory and professional development services we provide to schools, universities and training providers.

Higher education

The variation in assessment control mechanisms across international and institutional contexts in HE is a significant factor in how any implementation of the AIAS should be carried out. Some universities may mandate multiple review steps before assessments are released to students, while others conduct minimal checks and leave considerable flexibility for individual faculty members. In settings with high amounts of flexibility and limited centralised restrictions (which is more common in North American contexts), rapid experimentation is enabled when desired by educators, but it can also cause challenges for consistent student experiences and understanding across a programme, leading to fairness and equity concerns. One way to support faculty in these contexts is to work in a 'leading through the middle' approach, as discussed earlier. This can be achieved by recruiting 'discipline champions' who can support others to ideate tasks and then share these as exemplars with others in their discipline. In these settings which may not include standardised assessment templates, there will still likely be wide variation; therefore, any quality assurance efforts should focus on ensuring that the task mechanics match the declared level.

In more centralised systems, such as the United Kingdom, we believe that a combination of top-down policy and bottom-up design works well. Programme or discipline leaders might mandate the student-facing rationale and the requirements for any process evidence, while subject teams choose the levels and task types that fit disciplinary outcomes. Regardless of the level of centralised control, staff development focused on developing and teaching critical AI literacy (Roe, Furze, & Perkins, 2025a, 2025b) is important to support an understanding of the concepts and technologies under discussion, as well as the ability to pass this on to students. Further training focused on the practical skills of assessment redesign and knowledge of the AIAS is also important; we cannot expect all faculty to implement top-down diktats mandating the use of any assessment framework if no support is provided. At the HE level, there is also more scope to design authentic, domain-specific tasks that reward critique, synthesis, creativity, and orchestration rather than mere recall. This is consistent with current work that frames evaluative judgement as a central graduate capability in a time of GenAI (Bearman et al., 2024).

Ultimately, although institutional contexts and control mechanisms vary significantly across HE globally, the AIAS provides a flexible framework that can be adapted to local conditions while maintaining focus on the core objective of ensuring students develop both disciplinary expertise and the critical capabilities needed to work effectively with GenAI in their future professional lives. This mirrors current developments in the application of GenAI to research practice, where GenAI is becoming more integrated throughout the entire research cycle (Bjelobaba et al., 2025; Perkins & Roe, 2024a, 2024b), making transparency and justification of GenAI use core graduate capabilities.

K-12

K-12 education, particularly senior secondary assessment, operates within the framework of high-stakes standardised testing in most jurisdictions. This context has complicated discourses about AI, as examinations often become the 'tail that wags the dog' for many teachers and schools, that is, students must do an exam, and therefore all or most assessments in years 7-12 are turned into miniature exams. AI has been used as an excuse to move towards more end-of-unit, supervised, timed examinations, since those assessments are seen as both 'more secure' and reflect the formal exams that often come at the end of secondary schooling. However, this approach contradicts the best practices in assessment design. Valid assessments must be equitable, authentic, replicate real-world and practical skills, vary in form and mode, and enable teachers to build comprehensive pictures of students over time. While examinations are secure, they fail to meet these criteria (Dawson et al., 2024). Following Dawson et al.'s (2024) argument that AI use becomes unacceptable when validity is threatened, valid high-stakes assessments prohibiting AI become impossible if the prohibition cannot be enforced. This shifts the conversation from 'cheating' to adjusting assessment types and conditions.

The AIAS in K-12 contexts helps mediate this discourse by offering approaches to responsibly involve GenAI without defaulting to examinations. The framework supports validity in assessment through explicit teaching of outcomes outlined in curricula (content validity), selecting optimal assessment modes for outcomes (construct validity), considering design consequences on student behaviour (consequential validity), creating authentic assessments reflecting real-world applications, designing varied assessment formats, ensuring inclusivity and accessibility, combining formal and informal assessment while valuing professional judgements alongside external validation, and building assessment evidence over time to develop comprehensive student profiles. The 'Swiss Cheese' approach in education (Morley & Zmood, 2015; Rundle et al., 2020) provides a useful way

of combining these tasks to gain a greater overall awareness of the true performance of a student: assessments can be broken into separate tasks, some formal and others informal, with different 'slices' set at various AIAS levels. By building a unit of work with multiple points of assessment aligned to different levels of the scale, we can support students to have both opportunities to use the technology in authentic ways and methods of assessment that demonstrate their 'AI-free' knowledge and skills at other points. The chain of evidence is built up over time, and the teacher is not reliant on a single, high-stakes examination as the measure of a student's ability to attain the required learning outcomes.

Technical and vocational education and training

TVET demonstrates strong positioning for GenAI benefits, as assessment methods already largely exemplify the best practices outlined above. Vocational studies, in our experience, tend to focus more on observable skills and are much more likely than senior secondary or even HE to include assessments such as simulation, role play, direct observation, on-the-job Q&A, and scenario-based tasks. All of these assessment styles are less vulnerable to the kind of low-stakes academic integrity violations encountered by teachers whose primary mode of assessment is the essay or short/long answer written questions.

Because vocational assessment methods vary over time and typically lead to satisfactory/not satisfactory or competent/not competent marks rather than numerical grades, they appear less susceptible to cheating behaviours encountered in higher education settings, although we recognise that even practical assessment tasks remain vulnerable to cheating. Riis (2025) offers a TVET-specific articulation of GenAI integration inspired by the AIAS: five strategies from AI independent learning to AI-centric learning, illustrated through carpentry and grounded in socio-material perspectives. Together, these developments point to a coherent path for valid assessment in skills-based programmes

Many vocational courses have literacy and numeracy requirements, and we believe that AI can be used intelligently in these scenarios. If literacy assessment primarily concerns communication, Level 3 tasks that allow extensive GenAI use for drafting and editing written communications may be appropriate. Level 2 approaches might involve verbal note-taking, recording, transcription, and AI refinement, rather than starting from blank pages. Level 1 assessments in TVET are potentially easier to manage. At the time of writing, ChatGPT is proficient in writing essays but cannot rewire an electrical circuit, insert an intravenous drip, fix a cistern, or support a child in early childhood education with additional needs. All of these are observable skills that would be best assessed in a 'No AI', technology-free environment.

English as a foreign language and English for academic purposes

English as a Foreign Language (EFL) and English for Academic Purposes (EAP) contexts present a specific problem: when writing is the learning outcome, full text generation obscures whether learners have achieved the target construct (i.e. writing). Based on the authors' experience in these contexts and in the field of English as a Medium of Instruction (EMI) for EFL speakers, we developed specific adaptations for the AIAS. Our adaptations of the AIAS respond to this by defining alternate levels of the scale which protect evidence of independent language production while still teaching AI literacy (Roe et al., 2024; Roe, Furze, Perkins, et al., 2025; Roe, Perkins, et al., 2025) and encouraging the use of GenAI to potentially assist in language learning.

In practice, we recommend using Level 1 tasks for core writing and speaking under controlled conditions. Where these Level 1 tasks are written, we would encourage a short oral check to triangulate proficiency. Level 2 might be used for broader EAP tasks for planning and idea generation, with a brief rationale that shows how AI-sourced ideas were selected, refined, or rejected (note that EAP-style tasks can be used for both English as a first language and EFL speakers). When Level 3 is used for editing support, we recommend choosing a method that leaves a visible trail of changes, for example, a 'clean' final version plus a tracked-changes version with a short commentary. Higher levels of the AIAS should be reserved for assessing the production of specified communication pieces rather than unaided language production, such as genre adaptation for a specific audience. Rubrics should make this split explicit by separating language proficiency from content knowledge and AI-mediated communication.

This approach aligns with a broader point about learner agency. Students studying in a second language are often described as passive or lacking autonomy. Evidence shows that these are misconceptions. When provided with clear guidance, appropriate tools, and structured opportunities, these students readily engage in autonomous learning practices and can make sophisticated choices about when and how to use support, including AI (Roe & Perkins, 2020). The task is to design assessment conditions that allow students to demonstrate, rather than hide, this competency. The task is to design assessment conditions that allow students to make their agency visible by directing the tools, showing their checks, and accounting for access constraints (Roe & Perkins, 2024a).

Conclusion

Assessment in the GenAI era has changed dramatically and quickly, but our overall goals have not changed. We still need trustworthy evidence of what students know and can do, gathered under conditions that make sense for the outcome of the assessment. The AIAS can help when it is used to make these conditions explicit and redesign tasks. In this commentary, we mapped the most common challenges in implementing the AIAS and demonstrated how they undermine assessment validity.

Our experience shows three pitfalls that erode validity: declaring 'No AI' where enforcement is impossible, adding AI for its own sake, and retrofitting levels without redesigning tasks, rubrics, and student guidance. Equity is a parallel risk

for broader institutional trust if GenAI access, consistency, and accommodations are not planned across a programme or institution. We have illustrated how implementations differ across HE, K-12, TVET, and EFL/EAP, but the key challenges remain the same across all contexts.

Our key suggestions for the effective implementation of the AIAS are as follows:

1. Audit the broader validity of the assessments currently used;
2. Decide the appropriate AIAS level per task, then redesign the brief, evidence trail, and rubric to fit that choice;
3. Communicate permitted and prohibited uses in plain language and back it up through structural redesign;
4. Build a chain of evidence of student attainment over time, rather than relying on single high-stakes moments;
5. Align approaches within faculties to respect disciplinary and institutional norms while ensuring consistency for students;
6. Build faculty capability through training that includes supporting critical AI literacy and principles of assessment design;
7. Recognise equity issues and guarantee access to the required tools for all students.

The AIAS is not intended as a tool to optimistically laud the integration of AI into education, and there is good reason to resist AI in multiple educational contexts; critical analysis and scepticism should be our default position. However, the AIAS provides a framework within which to consider technological change, update our approach to assessing students, and offer transparency and clarity to all educational stakeholders when used in line with the principles outlined above. By integrating GenAI into assessment in this way, we can take steps to reduce broader structural inequities in GenAI assessment integration: redesign for what matters and be honest about what AI changes and what it does not (Perkins & Roe, 2025).

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Declaration of Generative AI and AI-assisted technologies in the writing process

The authors have used GenAI tools for ideation and in some passages of draft text creation which was then heavily revised, along with editing and revision during the production of the manuscript. The tools used were ChatGPT (GPT-5) and Claude (4.1 Opus), which were chosen for their ability to provide sophisticated feedback on textual outputs. These tools were selected and used supportively and not to replace core author responsibilities and activities. The authors reviewed, edited, and take responsibility for all outputs of the tools used.

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Evaluating the impact of perceived information quality on GenAI technology adoption in higher education students

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Abstract

This study investigates the significant influence of perceived information quality (PIQ) on students' engagement with AI technologies in higher education. Employing structural equation modelling (SEM), we analysed responses from 522 university students to understand how the perceived quality, reliability, and relevance of AI-related information affect their intent and actual usage of generative AI (GenAI). The results reveal that PIQ directly boosts students' readiness to adopt GenAI, with information frequency serving as a mediator that enhances perceived importance and credibility, thus fostering trust. Additionally, our results show that students who regularly interact with high-quality AI information are more likely to use GenAI tools. However, the presence of information overload can negatively impact actual usage despite high intent to use. These insights offer valuable guidance for educators, policymakers, and tech developers aiming to promote effective adoption of AI tools, thereby improving learning outcomes and student engagement in the digital age.

Introduction

Recent data indicate that 62% of students interact with GenAI tools (e.g., ChatGPT and Microsoft Copilot) in their academic activities, reflecting a significant rise from earlier levels (Microsoft, 2024). The rapid advancement of AI technologies is revolutionising work and learning, with higher education (HE) being no exception (Bearman et al., 2023; Mills et al., 2023). Some scholars liken the insurgence of GenAI to the invention of the calculator, and others offer the disruption Gutenberg's printing press caused to universities as a comparator, though GenAI extends far beyond this (Lodge et al., 2023). Students can now seek immediate referencing and research support from a well-programmed chatbot, or companionship with a social companion bot while completing their late-night assignments; with benefits and perils for both (Crawford et al., 2024). The increasing integration of GenAI tools in academic settings presents two potential avenues of application: (1) students using them autonomously to augment their learning experiences and (2) educator-driven integration to enhance pedagogical outcomes. This study distinctly focuses on the perspective of autonomous use of GenAI by students, which involves students independently employing these tools to support and enhance their learning processes. This approach is differentiated from how educators might integrate these tools into the curriculum, which often aligns with specific instructional strategies and learning goals.

Autonomous GenAI usage by students

Autonomous GenAI adoption by students primarily facilitates direct interaction with AI tools, enabling personalised learning enhancements such as immediate referencing, research support, and even companionship during late-night study sessions. In fact, these tools are becoming integral to how students meet their educational needs, fostering both engagement and academic performance. As such, there is an increase in the discourse on their use and misuse (Crawford et al., 2024; Ivanov et al., 2024). ChatGPT, for instance, is gaining popularity in education by supporting personalised learning experiences and innovative teaching methods (Nguyen et al., 2024; Bin-Nashwan et al., 2023; Rudolph et al., 2023; Rasul et al., 2023). Nicknamed 'Chatty G' in some Australian classrooms, this tool can enhance learning if properly adopted and integrated with effective pedagogical strategies.

Understanding what drives students to adopt GenAI autonomously is crucial for several reasons. First, the successful integration of GenAI in education can improve learning outcomes by delivering tailored content and support, boosting student engagement and performance (Nguyen et al., 2024; Bearman et al., 2023). Second, such insights can help educators and policymakers to develop strategies that promote the adoption of these technologies, ensuring their benefits are fully realised. Lastly, as GenAI continuously evolves, understanding the factors influencing their adoption —such as student characteristics including digital literacy and attitudes towards technology, policy-related factors e.g., privacy and data security concerns, learning environment conditions that facilitate/hinder the use of AI tools, and teacher characteristics including readiness and attitude towards integrating technology— can guide future research and development, guaranteeing these tools are designed to align with students' needs and preferences. Understanding the drivers of autonomous GenAI adoption by students is crucial for several reasons: it directly affects their learning outcomes by providing tailored academic support, boosts engagement and performance, and guides future technological developments to align with students' needs and preferences.

Theoretical and practical relevance

Technology adoption in education has a well-established nomological network, with key drivers including perceived usefulness, ease of use, and social influence (e.g., Lai et al., 2022). TAM and UTAUT are commonly employed frameworks in studying technology adoption. For GenAI, early adoption predictors from the students' perspective include expected benefits, attitude towards technology, and personal initiative rather than curriculum integration or instructional strategies (Yilmaz et al., 2023). Several studies have expanded these models to include factors, such as perceived trust and convenience, relevant to GenAI technologies in education (Choi et al., 2023). Trust in technology, such as GenAI, significantly shapes students' interactions with and adoption of emerging technologies (Wang et al., 2024). For GenAI, trust is essential. Students base their decisions on the trustworthiness of the technology and the accuracy and relevance of the information it provides, despite potential limitations in the data from these systems. High-quality information about the technology can enhance perceived reliability and usefulness (Choi et al., 2023).

In this context, PIQ is a strong theoretical lens for explaining the adoption of GenAI tools from a student perspective. PIQ is a well-established concept in technology acceptance/adoption literature, defined as the extent to which information is perceived as accurate, relevant, and trustworthy by its recipients (Bailey & Pearson, 1983). While its significance has been extensively validated in domains such as healthcare (Jiang et al., 2021), marketing, and information systems (Wu et al., 2021), PIQ remains underdeveloped in educational research, particularly in GenAI adoption. It is critical to distinguish between the information generated by AI tools, which students evaluate for quality and trust, and the instructional information about these tools, which educators must design and convey effectively. This distinction is important as the quality of information students receive about AI tools can significantly shape their perceptions and intentions to use them. We argue that while PIQ in this context would involve assessing the quality of information generated by GenAI tools, it is crucial to recognise that these perceptions can be influenced by the inherent limitations of the tools themselves, including the potential to deliver outdated or inaccurate outputs regardless of the quality of input prompts. This factor is critical as it impacts the perceived accuracy, relevance, and trustworthiness of the information provided by GenAI systems, thus affecting PIQ and the overall adoption of these technologies.

Empirical evidence from other fields —including healthcare (Jiang et al., 2021), e-commerce (Kim et al., 2019), online banking (Rahman et al., 2021), and government digital services (Aini et al., 2024)— suggests that high-quality information enhances trust by providing accurate, relevant, and transparent details, thereby increasing users' perceived value of the technology and their likelihood of adopting it (e.g., Wang & Zhao, 2023). Given the uniqueness of GenAI, where the quality of output is directly influenced by the quality of input prompts (Essien et al., 2024), it is important to consider how PIQ affects technology adoption in educational settings. This study aims to explore the role of PIQ in shaping students' intentions to autonomously adopt GenAI technologies and their actual usage, emphasising how the quality of information about GenAI tools influences their behavioural intentions and engagement frequency. Specifically, it examines how the perceived quality of information about GenAI tools influences students' behavioural intentions and the frequency with which they engage with it. We address a crucial gap in understanding the role of information quality in technology adoption (Behl et al., 2024), offering significant theoretical and practical implications. Theoretically, our study expands existing technology adoption models by integrating PIQ as a key determinant. Practically, it provides actionable insights for educators, policymakers, and GenAI technology developers by effectively communicating the benefits and capabilities of GenAI tools to students, thus enhancing adoption and usage. Our study focuses specifically on the autonomous use of GenAI by students to support their learning processes, distinguishing it from educators' integration of these tools into pedagogical strategies.

The contributions of our study are two-fold. First, we provide empirical evidence about the direct impact of PIQ on students' intentions to adopt GenAI technologies. By demonstrating that high-quality information significantly shapes these intentions, we emphasise the importance of information quality in promoting GenAI adoption. While our study highlights the ethical implications of disseminating high-quality information, it does not specifically provide strategies for ethical use. Instead, it identifies the critical role of accurate and trustworthy information in fostering responsible adoption practices. Second, our investigation into the mediating role of information frequency highlights how consistent, credible information further strengthens students' intentions, highlighting the need for ongoing, high-quality communication to maintain student engagement with GenAI technologies. Additionally, we address the risks of overcommunication, including information overload and cognitive fatigue, which can diminish effectiveness and ultimately lead to disengagement. Finally, we enhance the understanding of GenAI adoption in HE by presenting a comprehensive framework that integrates PIQ into existing technology adoption models, providing deeper insights into the factors influencing GenAI adoption in HE.

Literature review

Artificial intelligence and GenAI

There is growing interest in integrating AI into HE, driven by the rise of GenAI technologies (Nguyen et al., 2024; Sætra, 2023). These innovations offer both opportunities and challenges in reshaping education. GenAI can enhance personalised learning by offering tailored support in brainstorming, writing, and research, fostering a more individualised learning experience (Wang et al., 2024). Additionally, GenAI's capacity to generate complex content and simulate real-world scenarios benefits both language learning and technical education (Chiu, 2024). This transition from content creation to knowledge curation improves education quality and creates more engaging learning experiences.

However, integrating GenAI in HE also poses challenges. Issues surrounding academic integrity, accuracy, and ethical use are significant concerns (Crawford et al., 2024). The difficulty in detecting AI-generated content may lead to false accusations, potentially undermining academic integrity (Perkins et al., 2024). Moreover, there is evidence suggesting that while GenAI enhances understanding and application, it may hinder the development of critical thinking skills (Essien et al., 2024). In response, some scholars advocate for assessment disclosure scales to promote transparency between students and teachers, though these initiatives are still in their infancy (Rudolph et al. 2024; Perkins et al., 2024).

GenAI can also support international students by providing language assistance and improving accessibility. It can level the playing field for non-native English speakers by offering real-time language support and feedback, enhancing their academic experience (Zhai & Wibowo, 2023). However, over-reliance on GenAI may reduce human interaction and increase loneliness among students (Crawford et al., 2024). To address these challenges, Zhou et al. (2024) emphasise the importance of balancing AI integration with human elements to sustain student engagement and emotional well-being. To effectively integrate GenAI in HE, institutions must focus on developing GenAI literacy among students and educators, showcasing the capabilities, limitations, ethical use, and critical evaluation of AI-generated content. Additionally, there are calls for future research on innovative pedagogies and assessment methods that leverage AI while preserving academic integrity (Chiu, 2024; Perkins et al., 2024).

Theories of technology use

Technology adoption in education can be explained using various theoretical frameworks, such as the Technology Acceptance Model (TAM) (Davis, 1989). TAM suggests that *perceived usefulness* and *ease of use* are key factors that drive technology adoption. Building on these principles, this model has been widely applied in educational contexts, including understanding the use of technology in teaching (Scherer et al., 2019), social media for education, and adoption from a behavioural perspective (Wang & Zhao, 2023; Wang et al., 2024).

The Substitution, Augmentation, Modification, and Redefinition (SAMR) model (Puentedura, 2009) is another framework used to understand technology adoption in HE. It categorises technology use into four levels: substitution, augmentation, modification, and redefinition, assisting educators in evaluating the stages of technology integration and its potential for transformative change. In the context of AI adoption, the SAMR model has been applied to assess how AI can replace traditional methods, enhance learning experiences, modify teaching practices, and redefine educational paradigms. Halverson et al. (2023) also used the SAMR model to explore how perceived convenience and improved performance influence learning, emphasising these factors in driving technology adoption.

The SAMR model is relevant to this study as it provides a structured lens to evaluate how students' autonomous use of GenAI progresses from basic substitution of traditional academic tasks (e.g., using GenAI for summarising texts instead of manual notes) to more transformative uses that redefine their learning practices (e.g., leveraging GenAI to co-create content or generate novel research insights). SAMR highlights a structured approach to how perceived information quality influences initial acceptance by mapping students' adoption behaviours across these stages, supporting deeper, more innovative engagements with GenAI technologies over time.

Perceived information quality (PIQ), trust and technology use

PIQ is a multidimensional construct encompassing the perceived accuracy, relevance, timeliness, and trustworthiness of information (Bailey & Pearson, 1983). In the context of GenAI adoption, it refers to the quality of information provided by the tools themselves, as well as the information about their capabilities, limitations, and ethical considerations. High-quality information builds user trust and positively influences perceived usefulness and ease of use, foundational components of technology acceptance models (Davis, 1989; Venkatesh et al., 2003).

The role of PIQ in shaping technology adoption is well-documented across various domains, such as healthcare and e-learning (Jiang et al., 2021; Wu et al., 2021). For GenAI, PIQ takes on added significance due to the bidirectional relationship between input and output quality. Accurate, relevant, and trustworthy information enhances users' ability to craft effective prompts and interpret outputs, fostering a sense of control and reliability. Furthermore, clear and accessible information about the tools' capabilities and limitations can mitigate user apprehension and increase adoption likelihood (Choi et al., 2023).

Despite its importance, PIQ is often underdeveloped in educational research. While existing studies highlight its influence on user engagement and trust (Lee et al., 2024), they seldom address its role in GenAI adoption. This oversight is significant, as the unique operational dynamics of GenAI require a more granular understanding of how information quality impacts adoption decisions. For instance, does PIQ primarily affect trust in the tools' outputs, or does it also influence perceptions of their utility and relevance?

Additionally, PIQ must be clearly defined and contextualised. For this study, PIQ refers not only to the information generated by GenAI tools but also to the metadata about the tools themselves (their design, limitations, and ethical implications). This distinction is crucial for understanding how information quality influences trust and technology use. High-quality metadata, for example, can address student concerns about ethical use and potential harms, thereby promoting responsible adoption.

By integrating PIQ into established technology adoption frameworks, this research advances our understanding of the factors influencing GenAI adoption in HE. It also provides actionable recommendations for improving information delivery, ensuring that students receive accurate, relevant, and trustworthy information about GenAI tools. These insights are essential for balancing the benefits and risks of GenAI in educational settings, fostering trust, and promoting ethical and effective integration.

Proposed model

Guided by the identified opportunities in the literature, our study seeks to explore the role of PIQ in the adoption of GenAI technology in HE. Our research is driven by the question: *How does the perceived information quality model affect students' intentions and actual use of AI technologies in HE?*

In refining our study theoretical framework, we propose a model that integrates elements of PIQ—credibility, reliability, and importance—directly influencing the frequency of student interactions with GenAI technologies, subsequently affecting their behavioural intentions and actual usage in HE (see Figure 1). This approach redefines the traditional constructs of perceived ease of use and usefulness from the Technology Acceptance Model (TAM) by focusing on PIQ dimensions that are particularly relevant to GenAI technologies.

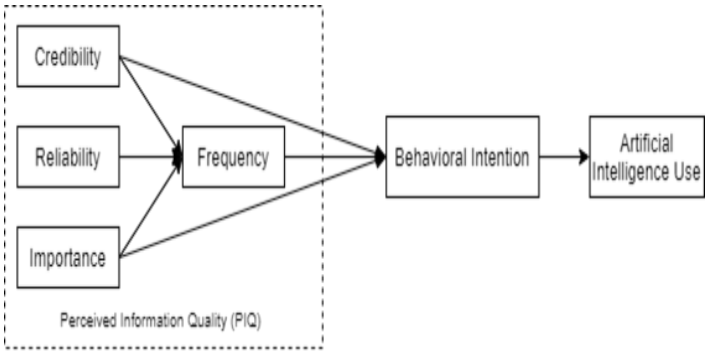

Figure 1: Proposed research model.

Figure 1 posits that more frequent interactions with credible, reliable, and important information about GenAI enhance students' willingness to adopt such technologies and lead to more consistent and practical usage. Our approach redefines the traditional constructs of *perceived ease of*

use and *usefulness* in TAM and UTAUT by focusing on information quality dimensions specifically relevant to GenAI technologies. Existing studies suggest that, in the context of advanced technologies (e.g., GenAI), traditional ease of use and perceived usefulness may not sufficiently capture the factors influencing adoption without considering the quality of information that shapes these perceptions. Recent studies (e.g., Wang et al., 2024) emphasise the evolving nature of technology acceptance models in digital environments, where information quality is a critical predictor of technology adoption, sometimes overshadowing ease of use and usefulness, especially in emerging technologies, such as AI. Additionally, Habibi et al. (2023) argue that as technologies advance, the quality of information about the technology—its accuracy, timeliness, and relevance—becomes crucial in influencing users' adoption decisions. We argue that by focusing on these specific dimensions of PIQ, our model can more accurately reflect the factors that drive the adoption of GenAI in HE settings.

Furthermore, the integration of PIQ into TAM is justified by its potential to address specific user concerns that directly influence technology acceptance. For instance, credibility, reliability, and importance are essential in shaping students' trust and perceived value of GenAI tools, which are decisive factors for technology adoption in educational settings. The modification of TAM to include these PIQ dimensions aims to provide a more comprehensive understanding of how quality information shapes student engagement and adoption processes in the context of GenAI. The validity of our modified TAM approach is supported by its alignment with the broader theoretical discourse that emphasises the importance of context-specific adaptations in technology acceptance models. This alignment ensures that our model both adheres to established theoretical foundations and resonates with the practical realities of GenAI adoption in education (Wang et al., 2024; Venkatesh & Bala, 2008).

Methodology

The study adopted a quantitative research design to allow for systematically measuring and analysing relationships between PIQ, behavioural intentions, and actual use of GenAI technologies among higher education students. This approach is well-suited to the research aim of testing hypothesised pathways using established theoretical constructs within a large, diverse sample. Structural equation modelling was selected as the primary analytical technique because it enables simultaneous testing of measurement and structural models, providing a robust framework to examine the direct and mediated effects hypothesised in this study (Hair et al., 2019). This research received ethics approval from the university's ethics committee, ensuring that all procedures complied with ethical standards and protected the participants' rights and well-being.

Participants

University students (18 years+) were the target HE student population, which comprises 254 million students globally (UNESCO, 2024). The target sample size was 385 to assure a 95 per cent level of confidence and more than 200 to meet Barrett's (2007) rule of thumb for structural equation modelling. Stratified sampling was used, which is advantageous in enabling specific population sub-group representation, thereby improving the precision of the estimates.

Procedure

The study employed a quantitative research design, utilising a survey to collect data from students in HE institutions worldwide. The online survey, created using Microsoft Forms, underwent rigorous face and content validity checks. A panel of educational technology experts reviewed the survey items for clarity and relevance, ensuring face validity. Content validity was confirmed using pilot testing with a student group whose feedback led to necessary revisions. The survey was promoted through email campaigns, social media, and university bulletin boards over four weeks to reach a diverse, representative sample. Ethical approval was granted by the University of [Withheld for Review] ethics board (Ethics ID:), ensuring all procedures adhered to ethical guidelines for research involving human participants.

Measures

Demographics. Demographics of gender, education discipline being studied, and education level were captured in single-item questions for each.

Perceived Information Quality. PIQ was measured using a composite measure developed to ask for credibility, frequency, reliability, and importance, drawing on existing theoretical models of PIQ (Bailey & Pearson, 1983). Participants rated items such as the perceived trustworthiness and relevance of different information sources on a scale from 1 (not credible) to 5 (strongly credible). As PIQ is a composite measure, we tested the items using principal components exploratory factor analysis and identified that all items loaded onto a single primary dimension (between .67-.83) with an eigen-factor of 13.68 and 59.48 per cent variance explained. Two other factors did exceed the 1.0 eigen-factor rule of thumb (1.897, 1.140), but in a scree plot review, only the first factor was retained (Cronbach's α = .97). In the maximum likelihood confirmatory factor analysis, similar results were observed ($\chi 2$ = 2.365, df = 1, $\chi 2/df$ = 2.365, p = .124; TLI = .99, CFI = .99, RMSEA = .05; SRMR = .006).

Behavioural Intentions to Use, and Actual Use of AI. We used TAM (Davis, 1989) literature as guidance to develop an item that related to behavioural intentions, namely "I intend to use AI technologies like ChatGPT for my educational needs", rated on a scale between 1 (strongly disagree) and 5 (strongly agree). For the actual use of AI, we used the item "In the past month, how frequently have you used AI technologies (e.g., Chatbots, ChatGPT, Perplexity AI, etc.) for your educational needs?" with response options ranging from 1 (never) to 5 (daily). This adjustment aims to provide a more direct assessment of actual usage patterns, aligning more closely with the objectives of the current

study to explore the impact of PIQ on real-world technology engagement.

Data analysis

The survey data underwent a two-step analysis process. First, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were performed to validate the survey constructs. Factor analysis helped identify the data underlying structure, ensuring accurate construct representation (Fabrigar & Wegener, 2012). For the main analysis, Maximum Likelihood Structural Equation Modelling (SEM) was used, selected for its ability to handle complex models with multiple constructs and indicators. This approach is particularly effective for managing non-normal data distributions, often encountered in survey research, and was suitable for the expected response size of just over 385 participants.

Results

Sample

A stratified random sampling method was employed to ensure representation across different faculties, levels of study, and prior exposure to AI technologies, recruiting a total of 522 respondents (see Table 1). There was a generally balanced gender distribution (266 males: 51.5%; 243 women: 47.1%; 7 undisclosed/other: 1.4%). Most of the participants were undergraduate students (63.5%), with a few postgraduate students (22.9%), doctoral students (7.7%), and undisclosed/other (5.9%). The respondents represented diverse academic disciplines, with Business and Management being the most common (21.7%), followed by Engineering and Technology (18.1%), Health and Medicine (13.8%), and Social Sciences (13.3%). Regarding the current use of AI technologies, most respondents classified themselves as having intermediate experience (46.3%), followed by beginners and advanced users, both at 21.5% and a small portion with no experience (10.6%).

Model specification

As shown in Figure 2, the structural model assessment showed reasonably strong fit indices ($\chi 2$ = .77, df = 3, $\chi 2/df$ = .257, p = .857; Tucker-Lewis Index (TLI) = .99, Comparative Fit Index = .99, Root Mean Square Error of Approximation (RMSEA) = .01; Standardised Root Mean Residual (SRMR) = .005). These indices suggest a robust model fit, with all relationships significant (p < .001). The analysis indicates that PIQ has a significant positive effect on student behavioural intentions to use AI technologies (β = .36, p < .001). This implies that when students perceive the information about AI technologies as credible, reliable, and important, they are more likely to exhibit intentions to use these technologies, which later progress into actual use behaviour. The PIQ influences the frequency with which students engage with AI-related content, which in turn enhances their behavioural intentions (β = .35, p < .001).

Table 1: Demographic statistics.

Variable	None	Basic	Interme -diate	Advanced	Total
Gender					
Man	21 (7.9%)	110 (41.4%)	123 (46.2%)	12 (4.5%)	266
Woman	19 (9%)	97 (46%)	89 (42.2%)	6 (2.8%)	211
Other/unspecified	3 (7.3%)	7 (17.1%)	27 (65.9%)	4 (9.7%)	41
Education Level					
Undergraduate	33 (9.2%)	157 (43.9%)	162 (45.2%)	6 (1.7%)	358
Postgraduate	6 (4.7%)	47 (37%)	67 (52.8%)	7 (5.5%)	127
Doctorate	1 (4%)	5 (20%)	11 (44%)	8 (32%)	25
Other	3 (37.5%)	3 (37.5%)	1 (12.5%)	1 (12.5%)	8
Academic Discipline					
Business and Management	7 (6%)	52 (45.3%)	56 (48.7%)	0	115
Health and Medicine	1 (14.3%)	1 (14.3%)	5 (71.4%)	0	7
Social Sciences	6 (5.7%)	56 (52.8%)	41 (38.7%)	3 (2.8%)	106
Engineering and Technology	6 (6%)	30 (30%)	58 (58%)	6 (6%)	100
Law and Humanities	11 (9.8%)	46 (41.1%)	49 (43.8%)	6 (5.3%)	112
Natural Sciences	9 (12.5%)	26 (36.1%)	31 (43%)	6 (8.4%)	72
Other	3 (30%)	2 (20%)	5 (50%)	0	10

To calculate the indirect effects within the model, bootstrapping was used with a sample of 2,000, with a .95 bias-corrected confidence level. When considering some of the indirect effects of elements of PIQ on AI use, there were some mediation effects, where behavioural intention mediated the relationship from credibility (.06, p = .004), importance (.04, p = .024), and frequency (.10, p = .001). Frequency also offered a mediation effect on behavioural intentions for credibility (.11, p = .001) and importance (.16, p = .001), although frequency had an insignificant mediation effect between reliability and intentions (.03, p = .001).

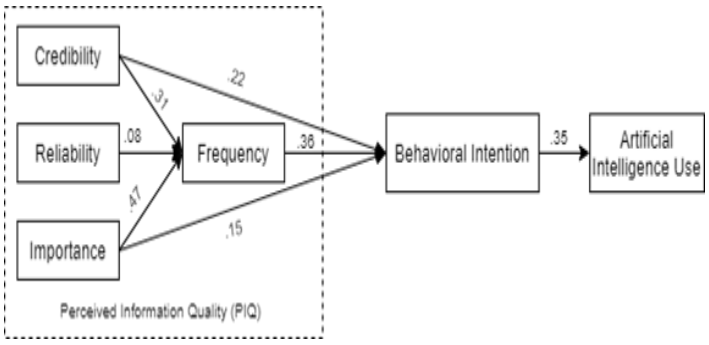

Figure 2: Perceived information quality effects on intentions and use.

In the supplementary analyses, we explored the impact of information overload on behavioural intentions and the actual use of AI technologies. Students were divided into two groups based on their frequency of content access: those experiencing information overload (top 25%) and those not experiencing overload. The analysis revealed significant differences in behavioural intentions and actual use between the two groups. Students experiencing information overload reported higher *behavioural intentions* (M = 4.29, SD = .51) compared to those not experiencing overload (M = 3.52, SD = 1.04); $t(519) = -10.48$, $p < .001$, Cohen's $d = .85$. Similarly, *actual use* of AI technologies was higher among students experiencing overload (M = 2.56, SD = .68) compared to those not experiencing overload (M = 2.40, SD = .72); $t(519) = -2.608$, $p < .001$, Cohen's $d = .70$. These results indicate that while frequent access to high-quality information enhances behavioural intentions, it may also lead to information overload, which has a complex impact on actual use. The findings emphasise the need for balancing information dissemination to maximise positive outcomes without causing overload.

Discussion

This study provides valuable insights into the factors influencing students' intentions to adopt GenAI technologies in HE, particularly highlighting the critical role of PIQ. By analysing PIQ dimensions such as credibility, reliability, perceived importance, and frequency, the findings offer actionable implications for improving AI integration within Learning Management Systems (LMSs).

Perceived information quality (PIQ) and behavioural intentions

The results confirm that higher PIQ is positively associated with students' behavioural intentions to use GenAI technologies. High-quality information fosters trust and perceived usefulness, both essential for technology adoption, as emphasised in the Technology Acceptance Model (TAM) (Davis, 1989; Venkatesh et al., 2003). These findings align with Jiang et al. (2021), who demonstrated that PIQ enhances perceived ease of use and usefulness in social media platforms, and Ahn et al. (2007), who highlighted its significance in shaping users' attitudes toward online banking systems. Our findings extend these insights to the context of GenAI technologies in HE, emphasising that credible, reliable, and relevant information significantly influences students' intentions.

Moreover, the accessibility and presentation of information are equally important. Wu et al. (2021) argue that well-organised, user-friendly, and accessible information improves satisfaction and the likelihood of technology adoption. These results align with the Information Systems Success Model (ISSM) (DeLone & McLean, 1992), which identifies information quality as a core factor influencing user satisfaction and system benefits. Therefore, LMS platforms must integrate AI features with intuitive interfaces, delivering reliable information tailored to students' needs.
Content access frequency as a mediator

The study identifies content access frequency as a key mediator between PIQ and behavioural intentions. Frequent engagement with high-quality AI-related content strengthens students' intentions to adopt GenAI technologies, consistent with Kim & Kwon (2024), who found that users are more likely to engage with content they perceive as high quality. Sustained exposure enhances understanding and trust, which are critical for encouraging adoption.

Additionally, the findings demonstrate that PIQ mitigates the adverse effects of information overload. While excessive information can impair decision-making and reduce adoption likelihood (Feroz et al., 2022), high-quality information helps educators and technology providers to support informed decision-making, thereby fostering GenAI adoption. For example, LMSs could use AI algorithms to personalise information delivery, ensuring it is relevant and manageable for students.

Theoretical implications

By integrating PIQ into well-established technology adoption models (e.g., TAM and UTAUT), our research provides a unique framework for understanding information-based mechanisms that institutions can use to nudge students towards integrating genAI for supporting learning (Wang & Zhao, 2023; Wang et al., 2024). Our findings reveal that students inundated with AI content reported significantly higher intentions to use the technology (mean difference = .77) compared to their actual usage (mean difference = .16), suggesting that mere information exposure might boost intent more than actual usage (Lai et al., 2022). This highlights the critical influence of information quality on shaping student perceptions and intentions towards GenAI adoption (Gante & Angelopoulos, 2023). Additionally, our study enriches the academic discussion about the role of active/ongoing interaction with high-quality information in technology acceptance/adoption (Behl et al., 2024). The mediation effect of content access frequency emphasises the need for continuous engagement with credible and pertinent information, shedding light on how information quality can directly affect behavioural intentions by fostering consistent interaction.

Practical implications

The findings of this study have significant implications for enhancing the integration of AI technologies within LMSs and other educational platforms. Higher education institutions can leverage these insights to ensure seamless and effective AI adoption, benefiting both students and educators (Behl et al., 2024). One crucial step is prioritising the development of AI literacy initiatives embedded within LMSs. For instance, resource hubs featuring tutorials on ethical AI use, prompt engineering, and the critical evaluation of AI-generated content can build students' confidence in leveraging GenAI tools effectively while fostering a deeper understanding of their capabilities and limitations.

AI-driven personalised dashboards should be incorporated into LMSs to adapt to individual student needs. These dashboards can recommend relevant resources, track academic progress, and provide tailored feedback, demonstrating the reliability and credibility of AI tools while improving learning outcomes. Managing the pacing and segmentation of information is equally important to mitigate the risks of information overload. LMS developers and educators should ensure that AI-related content is delivered incrementally and in manageable portions, with curated content streams and smart notification systems emphasising relevance and keeping students engaged without overwhelming them.

To support effective AI integration, institutions should provide educators with training, including templates, case studies, and pre-designed AI modules, enabling them to seamlessly incorporate AI tools into their teaching. Such support ensures consistent, high-quality information delivery to students while simplifying the adoption process for educators. Continuous feedback mechanisms are also essential to refine AI features within LMSs. Tools such as surveys, focus groups, and analytics dashboards can capture user experiences, enabling iterative improvements and ensuring that AI adoption strategies align with the evolving needs of students and educators.

Finally, delivering accurate, relevant, and trustworthy information in a user-friendly and accessible manner is critical for building trust and promoting AI adoption. Clear communication strategies that emphasise credibility can enhance students' intentions to use AI technologies. By adopting these strategies, higher education institutions can maximise the benefits of AI, foster engagement, improve learning outcomes, and advance digital transformation.

Future research

It is important to consider our study against identified limitations. First, the cross-sectional design limits our study to inferring associations rather than causations, highlighting the need for experimental designs to rigorously assess how PIQ impacts student behaviour over extended periods. Future research should also examine how the findings of this study can be applied across different contexts within higher education, such as disciplinary variations, levels of study, and institutional settings. Investigating how perceived information quality influences GenAI adoption in diverse academic disciplines—ranging from the humanities to STEM fields—could reveal discipline-specific patterns of use and trust. Furthermore, understanding differences in adoption between undergraduate and postgraduate students, or between research-intensive and teaching-focused institutions, may offer valuable insights for tailoring interventions and policies to promote effective and ethical use of GenAI tools across varied educational environments. In addition, it would be worth employing experimental methodologies to explore these causal relationships in greater depth, providing more definitive insights into how information quality influences student interactions with GenAI technologies. Additionally, it is crucial to further explore the dimensions of PIQ to understand the effects of misinformation or specific information sources on user behaviours. Such studies could investigate the roles of accuracy, relevance, and trustworthiness of information as distinct factors affecting technology adoption.

Conclusion

This study highlights the vital role of PIQ in shaping students' intentions to adopt genAI technologies in HE. Through a robust quantitative analysis using SEM, we found that credible, reliable, and relevant information significantly influences students' behavioural intentions toward GenAI adoption. These findings reinforce the importance of PIQ as a key determinant in technology adoption, in line with established frameworks that emphasise perceived usefulness, ease of use, and information quality. Importantly, our research identifies the frequency of information access as a mediator between PIQ and behavioural intentions. This highlights the need for consistent, high-quality information to maintain positive perceptions and encourage ongoing engagement with GenAI technologies. Such continuous interaction fosters a firm intention to use GenAI tools, ultimately influencing actual usage patterns.

The implications of these findings are significant for educators, policymakers, and AI developers. Prioritising the delivery of accurate, relevant, and accessible information is essential to cultivating positive attitudes and strong adoption intentions among students. However, the study also highlights the need for careful management of information dissemination. While high-quality information promotes positive behavioural intentions, excessive information can have a negative effect, reducing actual GenAI usage. Therefore, strategic pacing and segmentation of information are crucial for maximising effective GenAI adoption. Since we integrate PIQ into existing technology adoption models, our study provides valuable insights that can guide the successful integration of GenAI technologies in education, advancing digital transformation efforts.

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Student acceptance of ChatGPT in higher education: A mixed-method study of attitudes, intentions, and concerns

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Abstract

ChatGPT has become a widely accessible tool for university students, yet the factors influencing its acceptance or hesitation remain underexplored. This study investigates undergraduate students' attitudes, intentions, and behaviors toward using ChatGPT in higher education, using a mixed-method design with the Technology Acceptance Model (TAM). A revised TAM survey, incorporating constructs such as Perceived Ease of Use, Perceived Usefulness, Attitude, Behavioral Intention, and Actual Use, was administered to 687 students across nine institutions during December 2024. Results indicate that students who perceive ChatGPT as useful exhibit more positive attitudes, leading to stronger Behavioral Intentions and higher Actual Use for academic tasks outside the classroom. Additionally, open-ended responses and interviews highlighted both benefits and concerns. Key benefits included time savings, ease of information gathering, and enhanced creativity. Concerns focused on a lack of understanding of ChatGPT's functionalities, fear of over-reliance, mistrust of generated content, and risks to academic integrity. These findings suggest that while many students recognize ChatGPT's potential as a study aid, challenges related to user education and ethical use must be addressed. This study contributes to the growing discourse on AI integration in higher education by offering evidence-based insights and practical strategies for leveraging ChatGPT as an effective, ethical tool to support student learning in higher education.

Abbreviations:

AU= Actual Use
ATU= Attitude Towards Use
BIU= Behavioral Intention to Use
GenAI= Generative Artificial Intelligence
PU= Perceived Usefulness
PEU= Perceived Ease of Use
SEM= Structural Equation Model
TAM= Technology Acceptance Model

Introduction

The rapid rise of generative artificial intelligence (GenAI) tools, particularly ChatGPT, is reshaping the landscape of higher education. As Chen (2023) notes, the integration of AI into education is advancing rapidly, necessitating a closer examination of how students perceive and utilize these technologies. García-Peñalvo (2023) highlights that ChatGPT has transformed the discourse around technology in academia, prompting new and urgent questions about its role. Furthermore, Lo (2023) emphasizes the widespread global adoption of ChatGPT among students for academic success, signaling its profound impact on higher education. It is essential that we keep a close eye on the impact of AI within higher education and continue to reevaluate its role as a tool for students (Rudolph et al., 2025).

ChatGP's popularity is underpinned by its ability to provide personalized learning experiences, streamline academic tasks, and enhance engagement (Schiff, 2022; Wang et al., 2024). In addition, research indicates its potential to improve collaboration and provide real-time feedback, fostering more efficient learning environments (Almusaed et al., 2023; Judijanto et al., 2024). Another clear benefit it offers is its ability to deliver vast amounts of information quickly and support individualized responses aligns with the growing demand for personalized education (Gill et al., 2024). However, the growing reliance on ChatGPT raises critical concerns. Farrokhnia et al. (2023) caution against its potential to diminish critical thinking skills and jeopardize academic integrity through plagiarism. Kleebayoon and Wiwanitkit (2023) echo these concerns, pointing out the ease with which students can misuse AI for academic dishonesty, while Lin and Chang (2020) call for greater ethical considerations in its use.

Since the rise of ChatGPT in higher education, the lack of research focused on student opinions about its impact has become apparent (Sullivan et al., 2023) leading to a need for more student-centered data. Research shows that while many students recognize its efficiency and accessibility (Monib et al., 2024), concerns about the reliability and accuracy of its outputs persist. As Sok and Heng (2023) argue, balancing the benefits and challenges of ChatGPT is critical as its influence grows. Challenges such as insufficient knowledge of AI, negative attitudes, and difficulty aligning its use with coursework goals further complicate its integration into education (Chiu et al., 2023). Addressing these issues requires a deeper understanding of how students accept and adapt to this technology.

The Technology Acceptance Model (TAM), developed by Davis (1989), provides a valuable framework for exploring ChatGPT's role in higher education. According to TAM, students' acceptance of technology is influenced by their perceptions of its usefulness and ease of use. Recent studies applying TAM to ChatGPT adoption reveal varied insights. Research by Kumar and Anu (2024), Mourtajji and Arts-Chiss (2024), Shahzad et al. (2024), and Yilmaz et al. (2023) demonstrates the model's efficacy in understanding student attitudes and behaviors. Chawla et al. (2024) further highlight the importance of using mixed-method approaches to capture nuanced perspectives on ChatGPT's acceptance across cultural contexts.

This study aims to advance understanding of ChatGPT's impact on higher education through three key research questions:

RQ1. How accepting are higher education students of ChatGPT as a tool for completing academic work in terms of attitudes, intentions, and behaviors?

RQ2. What specific benefits and concerns do students report as reasons for their acceptance or hesitation to use ChatGPT?

RQ3. Based on the findings from RQ1 and RQ2, what recommendations can be made for using ChatGPT as an effective learning tool within higher education?

By addressing these questions, the research seeks to provide evidence-based strategies to harness ChatGPT's potential effectively while addressing its associated challenges.

Literature review

Technology Acceptance Model (TAM) research on ChatGPT

The Technology Acceptance Model (TAM), introduced by Davis (1989), is a cornerstone framework for understanding how students accept technology (Granić & Marangunić, 2019). It emphasizes that perceived usefulness (PU) and perceived ease of use (PEU) are key determinants of behavioral intention to use (BIU) and actual use (AU). Venkatesh and Davis (2000) validated the TAM's predictive power, establishing its application across diverse contexts, including educational technologies. Its relevance has only grown with the increasing integration of AI tools like ChatGPT into academic settings.

Recent studies applying TAM to ChatGPT reveal nuanced insights into student acceptance. Romero-Rodríguez et al. (2023), in their study of Spanish students, identified user experience as a decisive factor in acceptance, suggesting that intuitive design and responsiveness are paramount. This aligns with Liu and Ma (2024), who noted that PEU directly influences PU, which in turn shapes BIU, creating a domino effect in determining whether students adopt ChatGPT. Similarly, Sarraf et al. (2023) confirmed that PU and PEU are consistent predictors of AU, reinforcing the foundational principles of TAM.

Behavioral intention to use ChatGPT appears to be a particularly strong predictor of its actual adoption. Jo (2024) highlights that BIU significantly influences AU, a finding supported by Strzelecki (2023), who observed this relationship in a study of Polish students. Strzelecki et al. (2024) extended these findings by identifying habit and performance expectancy as influential factors, emphasizing that sustained use and demonstrated utility enhance acceptance. Additionally, Mutammimah et al. (2024) introduced attitudes toward use (ATU) as an intermediary

factor, showing that positive attitudes amplify BIU and, subsequently, AU.

However, challenges such as the tool's reliability can undermine these positive trajectories. Ngo (2023) found that vague and inconsistent outputs negatively impact PU, leading to reduced adoption rates. These findings point to a critical need for improving the accuracy of ChatGPT's responses and educating students about its limitations. Addressing these issues is vital for fostering a positive attitude toward the tool, as emphasized by Li and Zhang (2024), who argue that PU significantly influences ATU. The interconnected nature of these variables underscores the complexity of integrating ChatGPT into academic environments effectively.

Benefits for students using ChatGPT for academic work

The potential benefits of ChatGPT in education are numerous and transformative. Xiao and Zhi (2023) found that students value the speed and personalization of feedback provided by the tool, which allows them to address their academic challenges more effectively. Similarly, Rasul et al. (2023) observed that personalized learning facilitated by ChatGPT leads to improved academic performance by catering to individual needs and enhancing knowledge retention. The ability to deliver targeted feedback makes ChatGPT a valuable asset for students seeking to optimize their learning strategies.

Moreover, the efficiency ChatGPT brings to academic work cannot be understated. Zhang and Aslan (2021) highlighted its capacity to save time, enabling students to complete complex tasks more quickly. Mariani et al. (2023) and Ooi et al. (2023) both identified the combination of speed and data variety as a primary reason for ChatGPT's growing popularity in higher education. These attributes not only streamline academic workflows but also encourage self-directed learning. Du and Alm (2024) noted that the accessibility of knowledge through ChatGPT empowers students to explore topics independently, fostering a sense of autonomy in their studies.

Beyond efficiency, ChatGPT may contribute to cognitive and creative development. Dahri et al. (2024) reported that frequent use of ChatGPT enhances cognitive growth, particularly when high-quality outputs are leveraged for academic purposes. Chawla et al. (2024) added that ChatGPT supports creativity by allowing students to experiment with ideas and approaches in their work. While concerns about critical thinking have been raised, Kiryakova and Angelova (2023) and Xu et al. (2024) argue that ChatGPT can stimulate deeper engagement by motivating students to think critically about the information presented. Bai et al. (2023) further assert that by reducing cognitive load in information retrieval, ChatGPT enables students to focus on higher-order analytical tasks, potentially enhancing their critical thinking skills.

Student concerns about using ChatGPT for academic work

Despite its advantages, significant concerns remain about ChatGPT's integration into academic settings. A recurring issue is trust in the tool's accuracy. Esmaeil et al. (2023) highlighted that students often question the reliability of ChatGPT's outputs, which can lead to hesitancy in adopting the tool. This sentiment is echoed by Cheng et al. (2022), who found that trust plays a pivotal role in determining whether students view ChatGPT as a credible learning aid. Choudhury and Shamszare (2023) added that trust must be built through consistent and accurate performance, which is essential for fostering long-term acceptance.

Amin et al. (2024) demonstrated through a Systemic Equation Model (SEM) study that trust is a significant factor influencing ChatGPT's acceptance among Bangladeshi students. Conversely, a lack of trust can exacerbate concerns about misinformation, as observed by Dahri et al. (2024). Their findings suggest that while ChatGPT's outputs can be beneficial, any perceived inaccuracies can erode confidence, limiting its effectiveness as an educational tool.

Over-reliance on ChatGPT presents another challenge. So much so that some institutes may consider banning ChatGPT altogether to prevent students becoming too dependent on it (Kutty et al., 2024). In line with this, Ye et al. (2024) warned that excessive dependence on the tool might lead to inert thinking, where students struggle to apply knowledge creatively or critically. Van Dis et al. (2023) and Howard and Smith (2023) cautioned that ChatGPT's ease of use could foster addictive behavior, reducing students' willingness to engage in independent academic work. Morales-García et al. (2024) found that such reliance could also diminish motivation, as students may defer challenging tasks to ChatGPT, thereby weakening their problem-solving skills.

Ethical concerns further complicate ChatGPT's use. Many students express feelings of guilt when using the tool for academic purposes. Bae et al. (2024) and Jo (2024) reported that students often perceive their reliance on ChatGPT as akin to cheating, particularly in the absence of clear guidelines on its appropriate use. Aylsworth and Castro (2024) noted that this lack of clarity leaves students uncertain about the ethical boundaries of using AI tools, creating an environment of ambiguity and discomfort.

Educators also face challenges in integrating ChatGPT effectively. ElSayary (2024) highlighted that many teachers struggle to interpret data from ChatGPT and use it to guide students. Al-Mughairi and Bhaskar (2024) added that unclear guidance on ethical and pedagogical considerations leaves educators unsure of how to incorporate ChatGPT into their teaching. Iqbal et al. (2022) pointed out that teacher reluctance to embrace ChatGPT stems from fears of plagiarism and misuse, which ultimately deprive students of opportunities to learn how to use the tool responsibly.

By addressing these benefits and concerns, this literature review provides a comprehensive understanding of the factors influencing ChatGPT's integration into higher education. A nuanced approach that balances its potential

advantages with the need to mitigate its limitations will be essential for maximizing its impact on academic success.

Methodology

Research design

This study used an explanatory sequential mixed-method design, in which the quantitative phase informs the qualitative phase (Creswell & Clark, 2011). In particular, the quantitative phase involved the collection and analysis of numerical data via an online survey. The qualitative phase included semi-structured interviews and a thematic analysis of the interview material, which built on the survey results (Creswell & Clark, 2011) with the help of QualCoder software. The interview results supplement the quantitative findings by offering particular experiences from students enrolled in higher education across various institutions and nations, illustrating their acceptance and adoption of GenAI- ChatGPT Technology for learning purposes. This helps ensure a more nuanced understanding.

It is also worth noting that we have suggested the structural model (See Figure 1) based on the modified TAM and research questions to illustrate the predicted correlations between elements in the quantitative model. The following five hypotheses are included:

Hypothesis 1: PEU positively predicts PU

Hypothesis 2: PEU positively predicts ATU

Hypothesis 3: PU positively predicts ATU

Hypothesis 4: ATU positively predicts BIU

Hypothesis 5: BIU positively predicts AU

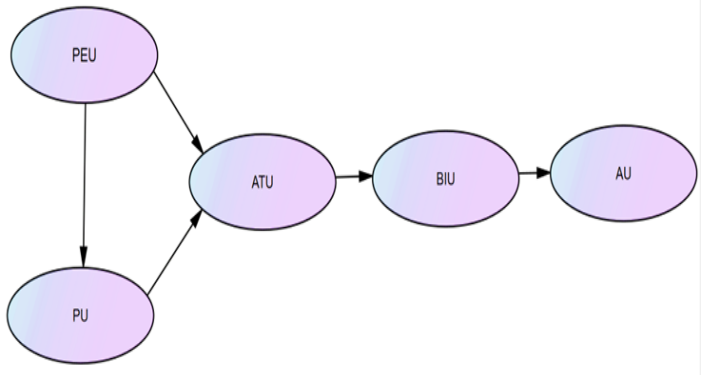

Figure 1. Structured model.

PEU= Perceived Ease of Use

PU= Perceived Usefulness

ATU= Attitude Towards Use

BIU= Behavioral Intention to Use

AU= Actual Use

Context and participants

Examining the variables affecting undergraduate students' adoption and usage of ChatGPT as a standard learning tool in higher education across nine institutions in three nations is the goal of this study. The study also evaluates students' awareness of using GenAI (ChatGPT) from multiple perspectives. During December 2024, the researchers collected a total of 687 quantitative data points (utilizing purposive sampling techniques to gather survey responses), 157 open-ended survey responses and 25 qualitative in-depth interview responses. These data were collected from undergraduate students in higher education across Japan, China, and New Zealand. These three regions were selected because they can uncover a wide view of student perspectives of ChatGPT and help fill the gap in research undertaken across this wide area within research.

The primary objective of the study is to gain a deeper understanding of the impact of ChatGPT on students' learning in higher education and to identify the factors influencing undergraduate students' use of ChatGPT. Additionally, the study seeks to shed light on the possible advantages and difficulties of integrating ChatGPT in higher education settings. To achieve this, we will adopt a mixed-methods approach, grounded in the TAM, and design a quantitative survey to collect data.

During the data collection period, 687 participants (387 male and 300 female) completed an online survey. All participants were undergraduate students, distributed across first-year, second-year, third-year, and fourth-year students in various majors. 157 of the students gave open-ended responses to each of the 15 survey questions to explain their answers in more detail. Furthermore, the final question of the survey asked participants if they were willing to participate in follow-up interviews, requesting their contact details. Qualitative data were collected by randomly selecting 25 respondents from the provided contact information.

Quantitative data collection and analysis

After revising the initial questionnaire, the final online survey was designed using the Sojump platform (http://www.sojump.com/) (see Appendix A for the survey questions). The survey was distributed to students from Japan, China, and New Zealand higher education institutions. It was circulated via posters and emails sent to students' inboxes, with a random selection from tutorial classes to participate. Participants could select their preferred language to read the questions in using a dropdown menu. In order to reduce the centrality effect, the survey in this study was in the form of a six-point Likert scale. Over 1,000 surveys were distributed, and 687 valid responses were collected. Upon completion of the survey, the author downloaded the 687 sample responses from the Sojump platform for further processing and analysis. The data collected from valid surveys will be used to measure the TAM and external constructs.

A six-point Likert scale is used in the survey, with 1 denoting "strongly disagree" and 6 denoting "strongly agree." The gathered data will be analyzed using descriptive statistics,

such as mean, standard deviation, and frequency distribution. The proposed connections between the constructions will also be tested using structural equation modelling, or SEM. The degree to which users' attitudes and behavioral intentions about using ChatGPT can be explained by the TAM model will be revealed via SEM analysis. The impact of external constructs on users' attitudes and intentions will also be investigated in this study.

We used SPSS 26.0 and AMOS 26.0 to run the quantitative data analysis in five steps utilizing SEM (Kline, 2023). The first was cleansing the data. Mahalanobis distance item skewness and kurtosis were used to filter the data for multivariate outliers and abnormalities. The results showed that the data were symmetric and non-skewed, making them appropriate for additional analysis, once inaccurate data points were eliminated. Based on the item means and standard deviations, we conducted descriptive analysis in the second stage to produce easily comprehensible insights. Third, we tested the reliability and validity of the data by calculating Cronbach's alpha (α) for each variable and conducting confirmatory factor analysis. Reliability and validity are crucial for subsequent data analysis. In the fourth step, we examined the relationships hypothesized in the model through path analysis and mediation analysis. Finally, we tested whether learners' adoption of new GenAI technologies could be explained by their experience with GenAI-ChatGPT using two group difference tests based on the established model.

Qualitative data collection and analysis

For the open-ended responses in the survey, participants could select their preferred language to read the questions in using a dropdown menu and were instructed to write their responses in the language in which they felt most capable of explaining their opinions. These responses were used for the qualitative portion of the study. Thematic analysis (Braun & Clarke, 2021) was used to identify and analyze key themes with the help of QualCoder software. Responses were translated using AI and coded separately by both researchers to create themes. After both researchers compared their results, the theme overlap rate reached over 95%, ensuring a high degree of consistency in the analysis.

Findings

Descriptive statistics

Descriptive statistical analysis was conducted on the demographic information of the 637 respondent samples. The results showed the following: (1) In terms of gender distribution, there were 384 male respondents and 300 female respondents (3 students preferred not to say), indicating a higher number of male users compared to female users. The sample data were collected via an online survey of 637 undergraduate students. After removing missing and outlier data, the final response count was 603. The data revealed that 54.7% of the respondents were male, while 45.3% were female. In terms of age, 96% of respondents were aged between 18 and 24 years. All participants were undergraduates.

The mean (M) and standard deviation (SD) values of the various dimensions of the questionnaire are presented in Table 1. The results indicate that students hold relatively high behavioral intentions, attitudes, and perceptions regarding the use of Gen AI ChatGPT in higher education. This suggests a strong willingness to continue using ChatGPT in the future. For instance, the item PU, Q8 ("ChatGPT helps me complete academic tasks more efficiently than traditional methods") yielded a mean of 5.11 (SD = 0.97), indicating that students in higher education have a highly positive attitude towards using generative AI for completing assignments or academic tasks. Furthermore, students express a high level of confidence about their future use of ChatGPT, with a promising outlook (Q4, M = 4.66, SD = 1.064). However, students' familiarity with using ChatGPT is not particularly high (see Table 1 below).

Table 1. Descriptive statistics.

Construct	Survey Item	M	SD	Alpha
PEU	Q1	4.95	1.027	0.875
PEU	Q7	4.81	1.327	0.875
PU	Q2	4.45	0.969	0.816
PU	Q8	5.11	0.970	0.816
PU	Q13	3.53	1.170	0.816
PU	Q15	4.02	1.458	0.816
ATU	Q3	4.27	1.161	0.809
ATU	Q9	4.43	1.313	0.809
ATU	Q14	4.17	1.359	0.809
BIU	Q4	4.66	1.064	0.812
BIU	Q10	4.35	1.478	0.812
BIU	Q12	3.74	1.593	0.812
AU	Q5	4.25	1.354	0.834
AU	Q6	4.30	1.088	0.834
AU	Q11	4.36	1.129	0.834

Reliability/validity checks

Before testing the structural model, it is necessary to check the reliability and validity of the measurement model to ensure that the structural equation model has better practical significance. We tested the reliability and validity of the data by calculating Cronbach's alpha (α) for each variable and conducting confirmatory factor analysis. Each item's validity, reliability, and factor load must be measured. Reliability is a measure of correspondence. When a measurement yields consistent results under consistent conditions, it is deemed trustworthy. To be deemed reliable, the load value for each

item must be equal to or larger than 0.7. Our Cronbach's alpha (α) = 0.923 (see Table 1 for every item's alpha (α)). This value means that the internal consistency of the survey is high.

The degree to which a construct's indicators collectively measure that construct is known as validity. When establishing convergent validity, the extracted mean variance (AVE), which computes the average of the squared loads of the construction-related items, is typically used. More than half of the variance in the project may be explained by the structure if the AVE value is 0.5 or more (Hair, Jr et al., 2016). During the reliability and convergent validity analysis in AMOS, it was found that some items had factor loadings lower than 0.60, meaning that the standardized coefficients did not meet the threshold. As a result, items with factor loadings below 0.60 were removed. After deleting these items, the discriminant validity (CR) values for the latent variables in the measurement model were re-examined. Suppose the CR values are above the standard threshold of 0.70. This value was recommended by Kline (2016) and thus indicated adequate internal reliability. In that case, each item is significant, the standardized coefficients are greater than 0.60, and the AVE is greater than 0.50 (Hu et al., 1999), which suggests that the measurement model owns good reliability and high internal consistency (which is crucial for both preliminary and subsequent research), as well as demonstrating convergent validity, as shown in Table 3 (convergent validity and discriminant validity). To examine discriminant validity, we followed the advice of Henseler et al. (2015) and computed all factors' Heterotrait-Monotrait Ratio of Correlations (HTMT), which were all below .90 and suggested the achievement of discriminant validity.

Table 2. Goodness-of-fit indices.

Goodness-of-fit	Threshold values	Value	Standard
χ^2 (CMIN)	-	118.639	-
DF	-	85	-
CMIN/DF	<3.000	1.396	Good
P-value	>0.050	0.122	Model fit is acceptable
RMSEA	<0.05	0.024	Good
GFI	>0.9	0.978	Good
CFI	>0.9	0.963	Good

We constructed a structural model and conducted the analysis using AMOS. The results showed a good model fit, with the following fit indices (The proposed model exhibited a satisfactory fit to the data, with the following fit indices: Kline 2016; Liu and Wang 2024; Wang et al., 2024): CFI = 0.963 ≥ 0.900, GFI = 0.978 ≥ 0.900, RMSEA = 0.024 ≤ 0.05, CMIN =118.639, DF= 85, CMIN/DF = 1.396 ≤ 3, The results of the subsequent hypothesis testing are shown in Table 2. The resulting p-value = 0.122, which is greater than 0.05, suggests that the model does not significantly differ from the data, indicating a good overall model fit. This further supports the adequacy of the proposed model alongside other strong fit indices. RMSEA is a significant absolute fit measure. Our model yielded an RMSEA of 0.024 ≤ 0.05, demonstrating an excellent fit according to Hu and Bentler (1999). CFI and GFI are key relative fit indices, with recommended values above 0.90 for acceptable model fit (Kline, 2016). The data from our model yielded a CFI of 0.963 and a GFI of 0.978, both indicating strong relative fit. The chi-square to degrees of freedom ratio (χ^2/df) is a primary measure of parsimony, with values typically ranging from 1 to 3, and a more stringent threshold being below 2 (Schumacker & Lomax, 2016). Our result was χ^2/df = 1.396, indicating that the fit between the hypothesized model and the data sample is acceptable (see Table 2).

Table 3. Convergent validity and discriminant validity.

Construct	AVE (>0.5)	CR (>0.7)	HTMT (<0.9)				
			PEU	PU	ATU	BIU	AU
PEU	0.67	0.82	-				
PU	0.56	0.93	0.61	-			
ATU	0.62	0.88	0.58	0.85	-		
BIU	0.52	0.78	0.52	0.78	0.81	-	
AU	0.69	0.89	0.53	0.76	0.77	0.68	-

Table 4. Hypotheses test results.

Hypothesis	B	*p*	t-value	r	Result
H1 PEU→ PU	0.75***	***	11.86	0.58	Supported
H2 PEU→ ATU	0.44***	0.067	1.15	0.46	Unsupported
H3 PU → ATU	0.57***	0.024	7.36	0.48	Supported
H4 ATU→ BIU	0.95***	***	16.98	0.69	Supported
H5 BIU→ AU	0.91***	***	16.12	0.66	Supported

Note: p<0.001***; *r* >.5=large effect size, while .5>*r* > .3=medium effect size.

Hypotheses testing and quantitative results

This study analyzes the hypotheses in the model through hypothesis testing, where PEU = Perceived Ease of Use, PU = Perceived Usefulness, ATU = Attitude Towards Use, BIU = Behavioral Intention to Use, and AU = Actual Use. The results of the hypothesis tests are presented in Table 4, where four out of the five hypotheses are supported. The findings indicate that PEU had a strong positive effect on PU, PU had a strong positive effect on ATU, ATU had a strong positive effect on BIU, and BIU also positively predicts AU. However, PEU did not significantly predict ATU. See Figure

2 for the full structural equation model and all hypothesised paths.

The way students in higher education use ChatGPT and the factors influencing their adoption of the tool can be clearly identified. The analysis reveals that Perceived Ease of Use (PEU) has a significant positive effect on students' Perceived Usefulness (PU). This indicates that the ease of use, user-friendly design, and convenience of the tool directly influence whether students adopt and how they use ChatGPT for learning, communication, and problem-solving. Additionally, PU has a direct impact on students' attitudes towards Use (ATU), suggesting that the usability and perceived value of the tool play a key role in shaping students' attitudes toward using it. ATU has a strong positive influence on Behavioral Intention to Use (BIU) ($\beta = 0.95$, $p < 0.001$), demonstrating that students' behaviors are largely governed by their attitudes.

However, PEU does not significantly predict ATU ($p > 0.05$), indicating that students' attitudes towards using ChatGPT are not strongly influenced by perceived ease of use or that the correlation between the two factors is weak.

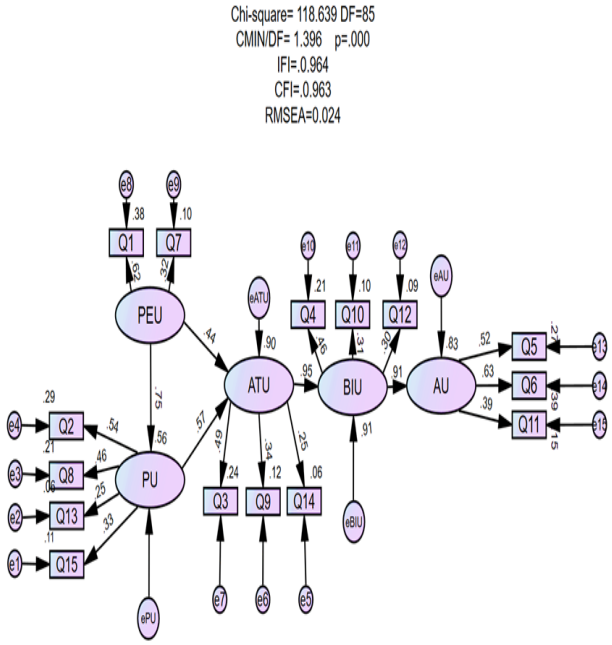

Figure 2. The final structural model.

Note: R^2 (PU = 56%; ATU=90%; BIU=91%; AU=83%); PEU= Perceived Ease of Use; PU= Perceived Usefulness; ATU= Attitude Towards Use; BIU= Behavioral Intention to Use; AU= Actual Use)

Qualitative results

Each of the 15 questions in the survey (Appendix A) was followed by an open-ended question asking students to explain their answers with as much detail as possible. 157 of the students gave detailed responses, which were used for a thematic analysis. Also, 25 students volunteered to give post-survey interviews to explain their responses in even greater detail. After all the data was collected, short responses that did not give clear reasons (such as "I don't like it" or "I don't use it") were removed and the data was received several times to code and group all of the survey and interview responses. Overall themes were then generated using QualCoder software for perceived benefits (Table 5) and concerns (Table 6) for the use of ChatGPT. Responses related to these themes were given as reasons for many of the survey questions, demonstrating a clear picture of the overall attitude of students towards the use of ChatGPT. The main benefits and concerns are summarized below.

Perceived benefits for the use of ChatGPT

Table 5 shows the three main benefits that students reported for using ChatGPT for their academic work. The first of these was studying more effectively and saving time. ChatGPT was reported as being very useful for helping make the undertaking and completion of academic work smoother and quicker than before the use of AI. One interview response which also related to this is below:

> "Sometimes the homework assigned by teachers requires us to be very fast, for example, only 11 weeks, so using ChatGPT can obviously help me find the materials I want in the shortest time, and it can. Very good, logical way to develop my own answers, so I think it was actually more productive (P1, Q6)."

Table 5. Benefit themes for the use of ChatGPT.

Benefit theme	Survey items (no. of related responses)	Example open-ended student responses
Studying more efficiently and saving time	Q1(8), Q2(35), Q3(35), Q4(32), Q5(36), Q6(20), Q8(35), Q9(50), Q10(40), Q14(35)	- "It allows me to complete tasks efficiently and spend time on what I need to do." - "What would normally take 2 hours can be done in 10 minutes." - "ChatGPT helps me complete assignments quickly." - "It is productive because you can use your time efficiently." - "It's faster to use ChatGPT than to look it up on various sites."
Acquiring new knowledge and perspectives	Q3(28), Q4(40), Q6(35), Q8(15), Q9(35), Q12(27), Q13(5), Q15(35)	- "It's fun because you gain a lot of knowledge." - "I can learn things outside of my knowledge." - "Using ChatGPT increases the amount of information I can get." - "It suggests things that you wouldn't think of on your own, so it will broaden your horizons." - "When I get stuck, it gives me new perspectives to think about things."
Generating new ideas and support with creativity	Q1(10), Q2(30), Q4(25), Q5(30), Q6(25), Q8(10), Q9(25), Q10(30), Q11(15), Q12(10)	- "It provides a variety of unique ideas, which inspire new ideas." - "I think it's very useful for coming up with ideas." - "It suggests ideas that I wouldn't have thought of." - "It gives you ideas and stimulates your imagination. It teaches me ideas that I would never have thought of." - "It suggests things that you wouldn't think of on your own, so it will broaden your horizons and make you more creative."

The next benefit reported was *acquiring new knowledge and perspectives*. Students viewed ChatGPT as a useful way to gather the information they needed to complete their academic work. A related interview response is below:

> "I later found out that ChatGPT is a much more complex AI that can learn a wide range of knowledge. For example, it can help me write articles and provide writing prompts and relevant examples. I will use this forever (P9, Q4)."

The final benefit found was generating new ideas and support with creativity. Students reported that ChatGPT was useful for helping them when they were stuck with finding ways to develop their work. An example of a related interview response is below:

> "ChatGPT has the potential to assist me in completing academic learning tasks by offering alternative ways to express ideas and helping me understand how to structure sentences more effectively. It's like having an additional resource to consult when I'm working on assignments or essays (P3, Q3)."

Concerns with the use of ChatGPT

Table 6 shows the four main concerns expressed by students for using ChatGPT for their academic work. The first of these was over-reliance affecting one's thinking. The students expressed concerns about becoming too dependent on the technology in a way which may negatively affect the development of their own critical thinking. An example interview response related to this overall concern is below:

> "One concern I foresee is the potential for overreliance on ChatGPT, which may hinder the development of independent thinking skills. Additionally, there may be challenges in discerning the appropriateness of generated content in specific academic contexts (P4, Q12)."

The second main concern was *mistrust of the reliability and accuracy.* Students expressed doubts about how much they could depend on the information they were receiving from ChatGPT during work. An example interview response related to this is below:

> "I don't believe it, because I once found that what it generated for me was not very accurate, it often wanted to learn more things through him, but I found that the things it generated were not a lot, and sometimes the things it generated may be for me. It is that the path of those references is not correct, so I sometimes do not believe it. Every time I take it over, I have to look at it again (P2, Q13)."

The third concern expressed was a sense of cheating and guilt. Students felt that it was too easy to complete work with ChatGPT and had a fear of being punished or having a feeling of academic dishonesty for using it to complete work. An example interview response is below:

Table 6. Concern themes for the use of ChatGPT.

Concern theme	Survey items (no. of related responses)	Example open-ended student responses
Over-reliance affecting one's thinking	Q1(7), Q2(28), Q4(15), Q6(15), Q8(5), Q9(15), Q10(27), Q11(8), Q12(21), Q15(26)	- "I don't want to rely on it as it might affect my critical thinking." - "Because it reduces the opportunities to think for yourself." - "I want to acquire the ability to think for myself." - "I think that relying too much on ChatGPT will weaken your ability to think for yourself." - "It is very useful for completing tasks efficiently, but depending on how you use it, it can reduce your thinking ability."
Mistrust of the reliability and accuracy	Q1(10), Q2(20), Q4(20), Q5(28), Q8(10), Q9(10), Q13(10), Q14(15)	- "ChatGPT isn't always correct, so you need to double-check." - "It's a good way to get information, but it's not guaranteed to be accurate." - "I don't trust the accuracy of the information on ChatGPT." - "I don't ask much because the answers are unreliable." - "I might think so if the content was more understandable and reliable."
A sense of cheating and guilt	Q2(12), Q3(19), Q4(18), Q8(5)	- "Even if you write a good report, if it's discovered that you used ChatGPT, your grade may go down." - "Because it will be obvious that ChatGPT wrote it." - "It makes you cheat and write reports." - "It automatically summarizes and translates, but I feel a little guilty about using it for assignments." - "Because it makes me feel like I'm cheating."

> "I won't use it. When it comes to ChatGPT, my primary concern is that the answers I generate might be too similar to those of other students, as there are times when I make minor modifications to the generated answers before submitting assignments (P8, Q4)."

The final main concern expressed was unfamiliarity with effective use. Students who did not know how to use it effectively to improve their academic work did not feel confident doing so and would hesitate to use it. An example interview response showing this is below:

> "I won't. I'm not very familiar with generative AI, especially tools like ChatGPT, as an academic learning tool. I've heard about it and I don't know too many prompts. I only use ChatGPT to paraphrase my writing tasks coz my academic writing was very weak, and I can only write very simple and easy short sentences (P6, Q4)."

Discussion

The findings of this study highlight the dual nature of ChatGPT as both a beneficial and potentially problematic tool for higher education students. Its rapid adoption reflects its utility in academic tasks, but the associated concerns underscore the need for balanced and informed integration into learning environments. This discussion synthesizes

the factors influencing ChatGPT adoption, the perceived benefits and concerns of its use, and actionable strategies to maximize its potential while addressing its challenges.

Structural Equation Modeling for the use of ChatGPT

The adoption and use of ChatGPT among students are influenced by several key factors identified through structural equation modeling (SEM). The findings demonstrate that student 'Perceived Ease of Use (PEU) plays a significant role in shaping their Perceived Usefulness (PU) of ChatGPT (as found by Liu & Ma, 2024). This relationship underscores how the simplicity, user-friendly design, and convenience of ChatGPT encourage students to adopt it for various academic purposes, such as learning, problem-solving, and communication. Furthermore, PU has a strong and direct impact on students' Attitude Towards Use (ATU) (in line with the findings by Li & Zhang, 2024), indicating that the perceived value and utility of ChatGPT are central to forming positive attitudes toward its use. These attitudes, in turn, influence Behavioral Intention to Use (BIU) (as shown by Mutammimah et al., 2024), which directly predicts actual usage behaviors (AU) (as found by Jo, 2024). However, PEU does not significantly impact ATU (unlike the findings by Supriyanto et al., 2024) suggesting that ease of use alone does not determine students' attitudes toward ChatGPT. Instead, students place greater emphasis on its functional value and alignment with their academic goals. These findings provide a foundation for understanding how students perceive and integrate ChatGPT into their academic work.

Specific benefits of ChatGPT

ChatGPT is widely acknowledged by students as a valuable tool for improving efficiency and productivity (Mariani et al., 2023; Xiao & Zhi, 2023; Zhang & Aslan, 2021). Its ability to streamline the completion of academic tasks enables students to save significant amounts of time, as illustrated by student responses highlighting how hours of work can be condensed into minutes. This efficiency allows students to reallocate their time to other academic or personal priorities, suggesting that ChatGPT can support effective time management. Furthermore, its capability to generate new ideas and provide diverse perspectives fosters creativity and critical thinking in academic work (Chawla et al., 2024; Kiryakova & Angelova, 2023; Xu et al., 2024). By presenting novel ways of approaching problems, ChatGPT encourages students to expand their intellectual horizons and consider alternative viewpoints.

In addition to supporting efficiency and creativity, ChatGPT provides students with opportunities to acquire new knowledge beyond their existing expertise (Dahri et al., 2024; Du & Alm, 2024; Rasul et al., 2023). Many students value its ability to offer writing prompts, relevant examples, and alternative approaches, making it a versatile resource for tackling academic challenges. These benefits align with the growing need for personalized and adaptive learning tools that cater to diverse student needs.

Specific concerns regarding ChatGPT

Despite its benefits, several concerns temper students' enthusiasm for ChatGPT. Chief among these is the fear of over-reliance (Kutty et al., 2024; Morales-García et al., 2024; Van Dis et al., 2023; Ye et al., 2024), which could impair the development of critical thinking skills (Mhlanga, 2023; Monib et al., 2024; Shiri, 2023). Students worry that habitual use of ChatGPT might reduce opportunities for independent thought and problem-solving, a concern that is particularly relevant in higher education, where fostering cognitive growth is paramount.

Another significant concern involves the reliability and accuracy of ChatGPT's outputs (Cheng et al., 2022; Dahri et al., 2024; Esmaeil et al., 2023). Many students expressed doubts about the factual correctness of its responses, emphasizing the need for careful validation and cross-referencing. This mistrust (Amin et al., 2024; Choudhury & Shamszare, 2023) stems from experiences where generated content was either incomplete or inaccurate, which undermines confidence in using the tool for academic purposes.

Feelings of guilt and concerns about academic dishonesty also emerge as barriers to widespread acceptance (Aylsworth & Castro, 2024; Bae et al., 2024; Jo, 2024). Students perceive the use of ChatGPT in academic tasks as akin to cheating, fearing punitive actions or the erosion of academic integrity (Howard & Smith, 2023; Singh et al., 2023). This apprehension is compounded by a lack of clear institutional policies on acceptable use (Al-Mughairi & Bhaskar, 2024; ElSayary, 2024).

Lastly, unfamiliarity with effective use limits the potential of ChatGPT for some students. Those who lack confidence or training in using generative AI report difficulty in fully utilizing its capabilities, which restricts its perceived utility (Iqbal et al., 2022; Singh et al., 2023).

Actionable recommendations

Educators play a crucial role in mitigating the concerns associated with ChatGPT while amplifying its benefits. They should design assignments and learning activities that require students to critically evaluate and validate ChatGPT's outputs. This approach not only reduces over-reliance but also strengthens students' analytical and problem-solving skills. Educators must also emphasize ethical usage, guiding students to be transparent about how and when ChatGPT is used in academic work. To ensure that students harness ChatGPT effectively, institutions should support faculty-led workshops on crafting effective prompts, interpreting AI-generated content, and integrating the tool as a supplementary resource rather than a substitute for learning. For students, developing strategies to validate ChatGPT's outputs is essential to overcoming mistrust in its reliability. Cross-referencing AI-generated information with credible sources can help build confidence in its use. Students should adopt a balanced approach, using ChatGPT as a tool for idea generation and efficiency while ensuring that their independent efforts remain central to their academic pursuits. Transparency in how ChatGPT is utilized is also

vital, as it helps students navigate ethical concerns and avoid perceptions of academic dishonesty.

Researchers can contribute to a deeper understanding of ChatGPT's impact by examining its role across diverse cultural and educational contexts. Further studies should investigate the long-term implications of ChatGPT use on cognitive skills such as creativity and critical thinking. Collaboration with AI developers to improve the transparency and explainability of ChatGPT outputs is another critical avenue for building trust and enhancing its adoption in higher education.

Educational institutions must take proactive steps to integrate AI literacy into curricula, ensuring that both students and educators are equipped to use ChatGPT responsibly. Establishing clear policies on the acceptable use of generative AI in academic work can provide a framework that upholds integrity while promoting innovation. Institutions should also invest in professional development programs for educators, equipping them with the tools and knowledge needed to effectively integrate ChatGPT into teaching methodologies.

Study limitations

While this study provides valuable insights, certain limitations must be acknowledged. The research primarily focused on a sample of students from Asian educational contexts, which may limit the generalizability of findings to broader, more diverse populations. Additionally, the depth of data collected through open-ended responses was constrained, with some participants offering minimal insights (e.g., "I don't enjoy it") that lacked elaboration. This limitation is partly attributed to the anonymity maintained during data collection; a measure designed to encourage honest feedback. However, the inability to follow up with respondents restricted opportunities for clarification and deeper exploration of their perspectives. These constraints highlight the need for future studies to adopt more inclusive sampling and consider mixed-methods approaches that balance anonymity with avenues for richer data collection.

Conclusions

This study explored the acceptance of ChatGPT among higher education students, examining their attitudes, intentions, and behaviors, as well as the specific benefits and concerns that shape their use of this generative AI tool. The findings revealed a nuanced perspective, with students acknowledging both the advantages and potential drawbacks of incorporating ChatGPT into their academic workflows.

Regarding RQ1, significant relationships were found between PU and ATU, ATU and BIU, PEU and PU, as well as BIU and AU. Most importantly, the findings indicate that higher education learners tend to associate the simple operational characteristics of ChatGPT with its usefulness in seeking help and supporting learning in the context of higher education, directly influencing their positive attitude towards using ChatGPT. Therefore, an important implication of this study is that scholars, experts, and educators in higher education from diverse backgrounds should provide students with the necessary expertise, actively guide or assist them in using GenAI for learning, and ensure the correct use of ChatGPT. Additionally, they should help students design effective prompts, differentiate between accurate and misleading information, and foster their critical thinking abilities.

In addressing RQ2, this study identified three primary benefits of ChatGPT that contribute to its acceptance among students. Learners appreciated its ability to save time, enhance efficiency, and streamline academic tasks, as well as its capacity to provide new knowledge and perspectives that broaden their understanding. Additionally, ChatGPT's support for creativity through idea generation was seen as a valuable tool for overcoming academic challenges and developing innovative solutions. However, these advantages were counterbalanced by concerns, including the risk of over-reliance, which could hinder critical thinking, mistrust in the accuracy and reliability of generated content, feelings of guilt or perceptions of academic dishonesty, and unfamiliarity with effective use. These findings emphasize the nuanced relationship students have with ChatGPT, recognizing its potential while remaining cautious about its limitations.

To address RQ3, this study emphasizes the importance of actionable strategies to harness ChatGPT's benefits while mitigating its challenges. Educators have a vital role in fostering critical thinking and guiding ethical AI use by integrating targeted training and curriculum design. Students should focus on developing skills to validate AI-generated outputs and adopt transparent practices to ensure responsible usage. Researchers can contribute by exploring the impact of ChatGPT across cultural and educational contexts, as well as collaborating with AI developers to enhance its transparency and reliability. Institutions, in turn, must establish clear policies and incorporate AI literacy programs to equip all stakeholders with the knowledge and tools necessary for effective and responsible engagement with ChatGPT.

In summary, while students are increasingly accepting ChatGPT as a learning tool, their attitudes reflect a balance of optimism and caution. By addressing the reported benefits and concerns through thoughtful implementation and policy-making, ChatGPT can become an integral and effective component of higher education, empowering students to learn more efficiently and creatively while fostering the critical skills essential for academic success.

Declarations

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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Appendix

Appendix A. Revised TAM questionnaire (with scales including Perceived Ease of Use, Perceived Usefulness, Attitude, Behavioral Intention, and Actual Use)

Survey Item	Question for students	Construct
Q1	ChatGPT is easy to use for completing my academic tasks.	Perceived Ease of Use
Q2	Using ChatGPT enhances my academic performance.	Perceived Usefulness
Q3	I enjoy using ChatGPT for my academic assignments.	Attitude Toward Use
Q4	I intend to use ChatGPT for my future academic work.	Behavioral Intention to Use
Q5	I frequently use ChatGPT to assist with my assignments.	Actual Use
Q6	Using ChatGPT makes my learning more creative and productive.	Actual Use
Q7	Learning how to use ChatGPT was simple and straightforward for me.	Perceived Ease of Use
Q8	ChatGPT helps me complete academic tasks more efficiently than traditional methods.	Perceived Usefulness
Q9	I believe using ChatGPT is a valuable addition to my learning tools.	Attitude Toward Use
Q10	I will continue using ChatGPT even after completing my current course.	Behavioral Intention to Use
Q11	I use ChatGPT regularly to seek assistance on specific academic problems.	Actual Use
Q12	ChatGPT encourages me to explore more creative solutions in my assignments.	Behavioral Intention to Use
Q13	I trust the responses generated by ChatGPT for academic purposes.	Perceived Usefulness
Q14	My peers encourage the use of ChatGPT for academic purposes.	Attitude towards use
Q15	Using ChatGPT has improved my critical thinking skills when solving academic problems.	Perceived Usefulness

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Integrating Large Language Models into EFL classrooms in China: Pedagogical innovations and critical reflections

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Keywords

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Abstract

This paper investigates the application of Large Language Models (LLMs), specifically DeepSeek, in foreign language education, focusing on the university course "Chinese Culture". It highlights the advantages of LLMs in enhancing personalized learning, instructional design, and immediate feedback. Through a systematic examination of pre-class preparation, classroom teaching, and post-class extension, the paper demonstrates how LLMs can transform traditional teaching methods by facilitating information retrieval, promoting critical thinking, and offering tailored support to students. The study reveals that the application of LLMs still encounters risks such as technological dependence, which can obscure students' actual proficiency levels, issues of information credibility, and various ethical challenges. Teachers must address these concerns through curricular restructuring and critical guidance. The research underscores the necessity for foreign language education to strike a balance between technological empowerment and humanistic values. It advocates for teachers to evolve into "AI collaborators" and value guides, enabling them to harness the supportive capabilities of LLMs while preserving the humanistic essence of education.

Introduction

LLMs, as deep learning-based natural language processing models, not only understand human language but also possess the ability to generate natural language. Consequently, they have been widely applied in fields such as text generation, machine translation, logical reasoning, and intelligent question-answering systems. Since the release of ChatGPT in 2022, the potential of LLMs in language education has gradually garnered attention from educational researchers (Rudolph et al., 2023b). Studies have shown that LLMs exhibit significant advantages in supporting personalized learning, assisting instructional design, and providing immediate feedback (Luckin & Holmes, 2016). As an emerging educational technology, LLMs not only offer innovative teaching tools for educators, driving the digital transformation of education, but also prompt new reflections on existing teaching models.

In China, university foreign language courses, as an integral part of the higher education system, bear the dual mission of cultivating students' language proficiency and cultural literacy (Byram, 2021; Liddicoat & Scarino, 2013). Introducing LLMs into university foreign language teaching can not only enrich teaching methods and optimize instructional activity design but also deepen students' understanding and mastery of the target language and culture. Taking DeepSeek as a representative of LLMs, this paper systematically explores its specific applications in foreign language education. The selection of DeepSeek as the platform in this study is based on two key considerations: Firstly, internationally dominant large language models such as ChatGPT and Claude face usage restrictions in the researcher's country, making direct application unfeasible. Secondly, DeepSeek, as an emerging large language model, has demonstrated performance comparable to or even surpassing that of models like ChatGPT in multiple evaluations. Specifically, in nine core metrics for English language processing, DeepSeek outperformed ChatGPT-4o in seven; in three Chinese language metrics, DeepSeek consistently led. This significant performance advantage has caused a market stir upon its release, with the resulting decline in US tech stocks and market capitalization losses reaching historic highs, a phenomenon widely covered by authoritative media outlets (Goldman & Egan, 2025; *The Economist*, 2025).

Focusing on the application of LLMs in the "Chinese Culture" course, the paper analyzes their impact on content restructuring and teaching model innovation through case studies of their use in pre-class preparation, classroom teaching, and post-class extension. It also examines the main challenges and coping strategies in their application. The research aims to provide theoretical and practical references for the effective application of LLMs in foreign language teaching, thereby promoting innovative development in foreign language education.

Literature review

Research on the relationship between artificial intelligence and education has existed for decades (e.g., Brown et al., 1975; Carbonell, 1970), though early findings were primarily published in computer science journals, reflecting the field's initial technical orientation (Selwyn, 2019). With technological advancements, research on artificial intelligence and education has gradually attracted widespread attention from educational researchers. Studies by Popenici and Kerr (2017), Camilleri (2018), Zawacki-Richter et al. (2019), Chen et al. (2020), and Holmes (2020) mark the continuous development of this field. In November 2022, OpenAI released ChatGPT, a significant milestone in AI research. Given its exceptional performance in natural language processing, researchers have extensively explored the impact of LLMs like ChatGPT on education, including teaching, learning, and research dimensions.

Current research on the impact of LLMs on educational reform primarily focuses on the following aspects: At the macro level, scholars such as Akinwalere and Ivanov (2022), Fuchs (2023), and Rahman and Watanobe (2023) have discussed the overall impact of LLMs on higher education, analyzing both their advantages and potential risks, and proposing corresponding coping strategies. In specific dimensions, scholars like Álvarez-Álvarez and Falcon (2023), Firat (2023), and Pack and Maloney (2023) have focused on the transformative role of LLMs in scientific research. While many scholars (e.g., Sajja et al., 2024) affirm the positive role of LLMs in promoting learning, others (e.g., Nguyen et al., 2023; Stolz et al., 2024) emphasize the ethical issues and potential risks associated with their application in education, which have become important topics in academic discussions.

Regarding the impact of LLMs on foreign language teaching, Kohnke et al. (2023) explored the functions of generative AI chatbots in language teaching, analyzing the controversies and limitations in their application, and proposed the digital competencies required for teachers and learners to use this technology effectively and ethically. Feng and Zhang (2024) analyzed the capabilities of ChatGPT-4o and Wenxin Large Model 4.0 in language services, affirming the strong potential of AI in assisting foreign language teaching and research. Zhang and Hong (2023) discussed how LLMs promote autonomous learning among foreign language learners and the transformation of teacher roles, revealing potential issues in the field of foreign language teaching and proposing strategies for cultivating critical thinking. Li (2024) explored the application scenarios and potential problems of ChatGPT in foreign language teaching based on an analysis of its functional characteristics, proposing macro-level coping strategies. Jiao and Chen (2023) analyzed the application of LLMs in English teaching from four major business scenarios: inspiring teaching wisdom through brainstorming, providing timely feedback for personalized teaching, creating conditions for cultivating higher-order thinking skills, and reducing the burden of automated assessment.

Additionally, some studies have examined LLMs in specific courses or teaching scenarios. For example, Kong (2024) investigated the impact of generative AI on teaching content and models with the intensive reading course as an example. Hou (2019) focused on a new oral English teaching model supported by LLMs, arguing that it promotes the intelligent transformation of oral English teaching and effectively

enhances teaching outcomes.

In summary, existing research reveals the potential value, practical challenges, and future impact of LLMs in education, providing important insights for their effective application in the field. However, most of these studies focus on the macro level. While several investigations address the use of LLMs in specific courses or scenarios, they often lack in-depth reflection based on practical experience. Moreover, most research focuses on ChatGPT, with limited studies on emerging LLMs like DeepSeek. Therefore, this study focuses on the application of DeepSeek in the course "Chinese Culture" where English is taught as the foreign language for Chinese students, exploring the impact of LLMs on foreign language teaching content and organization, and demonstrating their potential application value and considerations through specific practices.

Integrating LLMs into foreign language teaching

LLMs learn language patterns and features through massive data, endowing them with exceptional language understanding and generation capabilities. This technological foundation makes them ideal for empowering foreign language teaching. In the field of natural language processing, LLMs demonstrate significant advantages, providing diversified resource support for foreign language teaching and undertaking various auxiliary teaching tasks, allowing educators and learners to experience the convenience and value brought by AI technology. Foreign language teaching, with its core goal of cultivating cross-cultural communication skills and its focus on language skill training, naturally becomes an ideal application scenario for LLMs.

This study examines the "Chinese Culture" course, a 12-chapter program exploring philosophy, religion, literature, art, science and technology, festivals, traditional attire, and related themes. Focusing on the chapter dedicated to traditional Chinese art, the research uses Beijing Opera as a case study to demonstrate how LLMs, specifically DeepSeek, can be integrated into the teaching process, covering pre-class preparation, classroom teaching, and post-class extension. With the assistance of LLMs, students can complete tasks such as basic information retrieval, vocabulary, and grammar mastery through human-computer interaction outside the classroom. The core classroom tasks shift to solving complex higher-order problems, emphasizing the cultivation of learners' critical and innovative thinking skills.

Pre-class preparation stage

In the pre-class preparation phase, the teacher uses DeepSeek to assist in generating course outlines, designing discussion topics, and planning classroom activities. Additionally, the teacher leverages the platform to create quiz questions and devise creative classroom tasks, effectively improving teaching preparation efficiency. Furthermore, DeepSeek is also used to recommend supplementary materials such as videos, articles, and cultural stories to enrich teaching resources and stimulate student interest. For example, the electronic version of the textbook is uploaded to the platform, and DeepSeek generates a detailed teaching plan. This generated plan includes teaching objectives, required materials, course outlines, assessment methods, and extension activities. The course outline is further divided into six modules: warm-up activities, reading comprehension, vocabulary building, role-playing, comparative analysis, and summary reflection, each with specific implementation plans, ensuring strong operability. Additionally, DeepSeek generates Chinese and English introductions to Chinese opera, which are accurate and primarily used for post-class translation exercises to reinforce vocabulary and expressions learned in class. The platform also helps generate three classroom discussion questions to guide students in deeper thinking.

From the students' perspective, they use DeepSeek to obtain summaries of cultural concepts and historical events, laying the foundation for classroom learning. The platform's language processing capabilities help students understand technical terms, expand background knowledge, and enhance learning outcomes. Through interaction with DeepSeek, students can overcome language barriers during pre-class preparation, practice professional vocabulary and expressions, and improve their language application skills.

Classroom teaching stage

Since most language issues are resolved before class through DeepSeek, classroom teaching primarily focuses on cultivating students' critical thinking and value systems. The teacher uses the three critical thinking questions generated by DeepSeek (See Table 1) to guide students in in-depth discussions. These questions accurately capture the core content of the chapter and provide entry points for thinking and potential new vocabulary, helping students better express their views.

These questions are moderately challenging, progressively structured, and aligned with teaching principles. The first two questions are based on textbook content but require deeper thinking; the third question is closely related to real-world society, offering strong practical significance and appeal.

Classroom teaching is primarily interactive between teachers and students, focusing on issues that students were unable to resolve during pre-class preparation. Although LLMs can enhance interactivity in the classroom, their role is mainly supportive, such as providing vocabulary support or assisting in brainstorming. During discussions, the teacher guides students to use DeepSeek to obtain relevant information or case studies, enhancing the depth of discussion. Additionally, this course has a distinct value orientation, aiming to deepen students' understanding and identification with their own culture. This goal transcends what mere technical tools can achieve, so the teacher always plays a central guiding role in the classroom.

Table 1. Critical thinking questions generated by DeepSeek.

1. **Question 1**:

   How do the symbolic elements in Beijing Opera (e.g., facial makeup, costumes, and gestures) reflect the values and social structures of traditional Chinese society?

   - **Discussion Points**:
     - The use of colors in facial makeup (e.g., red for loyalty, white for treachery) reflects moral values.
     - Costumes indicate social status and profession (e.g., yellow for emperors, blue for scholars).
     - Gestures and movements symbolize actions and emotions, showing how non-verbal communication plays a key role in storytelling.

2. **Question 2**:

   In what ways do regional operas like Sichuan Opera and Kunqu Opera differ from Beijing Opera, and what might these differences tell us about the cultural diversity of China?

   - **Discussion Points**:
     - Sichuan Opera is known for its face-changing stunts and humor, reflecting the lively and playful culture of Sichuan.
     - *Kunqu* Opera, with its gentle and refined style, reflects the elegance and sophistication of Jiangnan culture.
     - These differences highlight how regional operas adapt to local tastes, dialects, and cultural traditions.

3. **Question 3**:

   What challenges do traditional Chinese operas face in the modern world, and how can they be preserved and promoted for future generations?

   - **Discussion Points**:
     - Modern entertainment (e.g., movies, TV shows) competes with traditional operas for audience attention.
     - Younger generations may find traditional operas less relatable due to their historical themes and slow pacing.
     - Solutions could include modern adaptations, educational programs, and digital platforms to reach a wider audience.

Beyond leading students to explore issues that were not effectively resolved before class, the teachers also guide students on how to use prompts and interact more efficiently with DeepSeek, and critically analyze the intelligent support provided by LLMs. For example, through analysis, students recognize that although LLMs provide logically clear answers, their reasoning tends to be conventional, and their arguments are often homogeneous, lacking unique insights. Furthermore, the teacher consciously guides students to evaluate the quality of LLM-generated content, including its authenticity, relevance, credibility, and professionalism, as well as identify potential biases and underlying intentions. Through this process, students fully understand that LLM-provided solutions are more suitable as starting points for further thinking. Learners must combine their experiences and knowledge to construct more creative and personalized solutions. Additionally, the teacher emphasizes the limitations of LLM-generated text, ensuring that students maintain a critical attitude when using LLMs for supplementary learning in pre- and post-class activities, avoiding blind reliance on their feedback (Rudolph et al., 2025).

Post-class extension stage

In traditional educational settings, delivering immediate, tailored, and comprehensive feedback for each individual student presents significant challenges. However, the incorporation of LLMs facilitates the realization of this objective.

LLMs help students improve their English expression skills through language polishing and translation training while deepening their understanding of Chinese culture. Additionally, LLMs assist the teacher in generating quizzes to assess learning outcomes and identify knowledge gaps through learning log analysis. As a valuable assistant to the teacher, DeepSeek provides students with language learning feedback at any time and offers personalized learning support based on individual progress and interests, becoming a tireless professional guide. For example, after completing the teaching of this section, the teacher asks students to write an English essay on "The Code in Beijing Opera Facial Makeup" and use Deepseek for grammar correction and cultural accuracy assessment. Simultaneously, the teacher uses the chapter summary generated by DeepSeek as translation practice material, requiring students to translate it themselves before seeking revision suggestions from the platform. To address the lack of oral practice, the teacher uses the voice call feature to allow students to engage in oral communication with the LLM on the topic after class. The LLM can evaluate students' expressions from language, logic, and content dimensions, providing real-time feedback, effectively enhancing student participation and personalized oral practice outcomes. In addition, the course also leverages DeepSeek to create diverse quiz questions derived from uploaded documents. The generated multiple-choice questions are designed with plausible distractors, while the true/false questions are accompanied by detailed explanations, which could be used directly to assess the outcomes of classroom instruction (See Table 2).

Table 2. Some of the quiz questions generated by DeepSeek.

Multiple Choice Questions:

1. **Question 1**:
   What are the four basic skills of Beijing Opera?
   A) Singing, dancing, acting, and painting
   B) Singing, recitation, acting, and acrobatic fighting
   C) Singing, martial arts, acrobatics, and painting
   D) Recitation, dancing, acting, and martial arts
   Correct Answer: B) Singing, recitation, acting, and acrobatic fighting

2. **Question 2**:
   Which color in Beijing Opera facial makeup typically represents loyalty and bravery?
   A) White B) Red C) Yellow D) Green
   Correct Answer: B) Red

3. **Question 3**:
   Which of the following operas is known as the "mother of Chinese operas"?
   A) Beijing Opera B) Sichuan Opera C) *Kunqu* Opera D) Henan Opera
   Correct Answer: C) *Kunqu* Opera

4. **Question 4**:
   What is the main characteristic of the *xiaosheng* role in Beijing Opera?
   A) They wear colorful facial makeup.
   B) They use a combination of real and falsetto voices.
   C) They are known for their acrobatic fighting skills.
   D) They play elderly women.
   Correct Answer: B) They use a combination of real and falsetto voices.

5. **Question 5**:
   Which of the following is a famous stunt in Sichuan Opera?
   A) Singing in falsetto B) Face-changing C) Acrobatic fighting D) Playing traditional instruments
   Correct Answer: B) Face-changing

Furthermore, during the post-instructional phase, educators can leverage LLMs to curate personalized supplementary reading materials tailored to students' proficiency levels, thereby fostering sustained intellectual engagement beyond classroom hours. The analytical capabilities of LLMs further enable systematic examination of granular student feedback data, facilitating evidence-based refinement of pedagogical approaches.

Reflections on integrating LLMs into classroom teaching

This section reflects on the advantages and considerations of applying LLMs, represented by DeepSeek, in educational applications. Undeniably, LLMs have demonstrated powerful capabilities in natural language processing, and their integration into foreign language teaching has brought unprecedented changes to both teachers and students, profoundly impacting course design and implementation. In AI-empowered foreign language teaching, intelligent systems can be teachers, supervisors, or communication partners. Learners are not only recipients of foreign language knowledge but also active users of language and proactive thinkers. LLMs have significantly enhanced the convenience of teaching and learning processes, thereby improving instructional efficiency. However, we must also recognize that the emergence and application of this technology warrant deep reflection.

Point #1: Transformation and restructuring of course design

The emergence and application of LLMs have brought profound transformation and restructuring to traditional foreign language course design. This technological innovation not only challenges traditional teaching concepts but also redefines the roles of teachers and students in the teaching process. In traditional foreign language teaching settings, the training and transmission of language and cultural knowledge are predominant. However, the impressive capabilities of LLMs in tasks such as translation, writing, and syntax-semantic parsing position them as powerful assistants for teachers, as they can handle many basic tasks efficiently. Therefore, when designing teaching, teachers should fully consider the application of LLMs, delegating some simple, repetitive training content to LLMs. For example, in foreign language courses such as "Chinese Culture", certain foundational knowledge tasks and language skill training can be effectively managed by LLMs. This not only improves teaching efficiency but also allows teachers to take on the roles of supervisors, designers, and guides, focusing on cultivating students' self-directed learning and exploratory learning abilities.

The core goal of language courses is not only language learning but also cultural acquisition and thinking training (Han, 2002; Liddicoat & Scarino, 2013). Classrooms should focus on solving complex problems, training higher-order thinking, and cultivating students' critical thinking and values. This shift in teaching concepts requires foreign language educators to adjust teaching methods and designs in a timely manner, transitioning from traditional knowledge transmission to a competency-oriented training model, promoting the integration of virtual and real-world classroom teaching.

In an environment where teachers and students can equally share the knowledge, advice, and judgments provided by intelligent systems, foreign language teaching methods, content, and evaluation systems must be reorganized. Foreign language education urgently needs to construct a new teaching paradigm. This transformation is merely one aspect or beginning of the many changes in the field, but its profound impact cannot be ignored. In the future, the transformation of foreign language classrooms, the renewal of teaching concepts, and how to guide students to actively and proactively learn will become key issues that need to be deeply considered in teaching design.

Point #2: Current technical issues

While current AI technology has made significant progress, it still faces numerous technical challenges. Generative artificial intelligence has long been shrouded in hyperbolic discourse within academic and technological circles (Rudolph et al., 2025). As Chomsky et al. (2023) point out, ChatGPT and similar systems have inherent flaws in balancing creativity and constraints. Specifically, there are two main issues: over-generation, where the model may simultaneously produce both true and false information, supporting both moral and immoral decisions, and under-generation, where the model lacks commitment when making decisions and is indifferent to consequences (Chomsky et al., 2023).

One manifestation of this is the credibility of data and feedback provided by LLMs. As data-driven models, LLMs lack an understanding of the real-world state and rules behind the data, so their generated results may not always align with real-world facts and logic. In some cases, the model may fabricate information or cater to the questioner's tendencies when questioned. For instance, when recommending books on Chinese opera, DeepSeek accurately recommended seven books, while ChatGPT recommended ten books, some of which did not exist, demonstrating a situation of 'speaking nonsense with a straight face.'

Therefore, we should maintain a cautious attitude toward the factual information provided by LLMs. Machine-generated knowledge cannot guarantee complete accuracy, especially in collaborative learning scenarios where learners cannot fully rely on this information. The machine itself cannot determine the rationality and correctness of its output, posing a risk of acquiring incorrect knowledge for learners lacking experience with LLMs. When interacting with LLMs, learners need to maintain a questioning attitude, and for important content, they should verify and cross-check through multiple means. In this process, teachers' guidance and assistance remain the most direct and effective way to avoid various risks (Qin, 2023).

Point #3: Changes in teacher competencies

Will teachers become obsolete under the strong impact of LLMs? During the drafting of this article, reports emerged of an Arizona-based charter school receiving approval to implement fully AI-driven academic guidance for students in grades 4-8 (Prada, 2024). This case has sparked widespread discussion about the future of teacher roles. Although LLMs have shown great potential in foreign language education, it is premature to claim that they will completely replace foreign language teachers (Chan & Tsi, 2024; Ghazali et al., 2024; Rudolph et al., 2023a). Currently, while LLMs reduce the burden on teachers in knowledge transmission, they also impose higher demands on this group. Although LLMs take on some simple, repetitive knowledge-based tasks, teachers face new challenges in course design, shifts in educational concepts, and the enhancement of technical competencies.

First, to fully leverage the potential of LLMs in foreign language teaching, teachers need to redesign the course system under new technological conditions. For example, based on the automatic generation capabilities of LLMs, teachers need to design new teaching modules such as AI-assisted writing, intelligent translation, and comparative analysis (Kohnke et al., 2023). Only then can LLMs be fully integrated into language teaching, leveraging big data to create smart classrooms and build cross-cultural communication environments, providing students with a new environment for intelligent foreign language learning.

Second, teachers need to update their educational concepts and redefine their roles in a timely manner. Traditionally, foreign language teachers have primarily been responsible for transmitting foreign language and cultural knowledge, acting as "knowledge porters" (Hu & Gao, 2024). Some foreign language teachers have outdated ideas and insufficient hands-on skills (Li, 2024). However, in the context of LLMs, students can access and obtain vast amounts of information just like teachers, partially diminishing the teacher's role as the main body of knowledge transmission. In this context, the role of foreign language teachers as knowledge authorities is challenged, and they need to expand into knowledge producers, innovators, and "AI collaborators".

Teachers also need to continuously enhance their technological literacy. The widespread application of LLMs heralds the advent of a new era in education. In this new epoch of knowledge production, educators are not only tasked with imparting knowledge but also with mastering the skills to interact with mainstream LLMs, effectively integrating them into teaching practices, and formulating targeted pedagogical strategies. The rapid pace of technological advancements imposes constant pressure on continuous learning. Teachers need to develop a 'technological sensitivity,' continually improve their technological literacy, and acquire the ability to guide learners in critically utilizing the outputs of LLMs. In the age of AI, while teachers who are unfamiliar with the technology may not be replaced outright, they could be overshadowed by those who are proficient in using it effectively (Zhang & Dong, 2020). This also echoes Neil Selwyn's (2019) critical observation: while it would be misguided to position AI technology as ready replacements for human-centered educational processes, it proves equally "foolish" to assume teaching methodologies will remain static amidst rapid AI advancement.

Point #4: Technological dependence and the masking of true proficiency

The impact of LLMs on learners' creativity is twofold: it can both inspire and stimulate creativity, and it can also constrain intellectual development, leading to over-reliance on intelligent technology. In foreign language learning, the intervention of LLMs may obscure students' true language proficiency (Kong, 2024). Students may become overly dependent on model-generated texts, reducing opportunities for independent thinking and expression. This over-reliance on LLMs can inhibit students' learning motivation and agency, impeding the enhancement of their knowledge and skills (Kim et al., 2025). If students rely on models for assignments or writing, they may develop a superficial understanding of language structures and vocabulary. Teachers may find it challenging to assess whether students have genuinely mastered the relevant knowledge and skills. The convenience of models may lead to a decline in students' interest and initiative in learning, affecting long-term language development. Moreover, excessive reliance on LLMs can impair original innovation and critical thinking, as the use of model-generated content may suppress students' creative thinking and independent writing abilities. Machine-generated personalized learning scenarios may create "information cocoons" (Sunstein, 2006), hindering students from expressing diverse needs. Therefore, teachers should guide students to use language models rationally, treating them as auxiliary tools rather than substitutes. Encouraging students to engage in critical thinking when using models and analyzing the outputs is essential. While leveraging the advantages of LLMs, it is crucial to maintain students' independent thinking and learning capabilities.

Additionally, the intervention of LLMs raises issues of technological misuse and academic integrity (Rudolph et al., 2025). Machine-generated content used in academic exams, assignments, or thesis writing can lead to academic misconduct and integrity concerns (Chaka, 2024; Mohammadkarimi, 2023; Susnjak & McIntosh, 2024). Whether students using LLMs to complete assignments constitutes plagiarism is a complex issue, and determining when it is appropriate to use such tools is equally challenging.

Point #5: Instrumentality of technology and the humanistic nature of language teaching

For a long time, academia has overemphasized the instrumental nature of foreign language disciplines while neglecting their humanistic aspects. Particularly in higher education, the core of foreign language teaching often focuses on the cultivation of language skills, making skill training dominate the curriculum. Although some foreign language courses include humanistic education content, these elements are usually peripheral and fail to form a systematic humanistic education framework.

Take the English course "Chinese Culture" as an example. We should not merely treat it as a tool for language skill development or simply position it as a means to enhance students' English listening, speaking, reading, and writing abilities within a Chinese cultural context. Such an instrumental teaching perspective fails to fully explore the course's deeper value in personal holistic development and educational humanism. One of the course's key objectives is guiding students to understand and identify with their own traditional culture. Although LLMs demonstrate significant advantages in natural language processing, their neutrality in ethical judgment and value guidance necessitates human intervention and guidance in their application within the course. As an English course for non-English majors, "Chinese Culture" transcends the traditional paradigm of language instrumentalism, aiming not only to provide language skill training materials in specific fields but also to cultivate students' cross-cultural understanding, critical thinking, and humanistic literacy.

While LLMs can provide abundant information and knowledge, they cannot convey the emotional and ethical values closely tied to personal experience. Although AI technology demonstrates significant advantages in training listening, speaking, reading, writing, and translation skills in foreign language teaching, the essence of education lies in nurturing individuals, a core task that can only be accomplished by humans themselves (Zhang & Dong, 2020). Therefore, teachers should focus on cultivating students' emotions and values, enhancing their moral judgment and social responsibility (Kong, 2024). However, the limitations of LLMs as platforms offering 'neutral' values are particularly evident in guiding students' values. Emotional cultivation and value shaping, as core components of moral education, are areas where AI technology falls short (Li, 2024). Foreign language teaching should be a process that subtly enhances students' humanistic literacy and moral qualities. Teachers should integrate moral and humanistic education into language teaching, helping students understand the cultural backgrounds and values of different countries and regions, thereby strengthening their cross-cultural communication skills and social responsibility. Therefore, in the context of LLMs, we should not overemphasize the instrumental nature of foreign language disciplines at the expense of their humanistic aspects (Rudolph et al., 2024). When technology deeply intervenes in humanistic education, the true value of education lies in maintaining an "appropriate distance" from technology, achieving genuine holistic development in the tension between technological empowerment and humanistic commitment.

Conclusion

This paper explores the practical application of LLMs, exemplified by Deepseek, in the university English course "Chinese Culture". It offers a deep reflection on existing practices through specific case studies. The findings reveal that LLMs provide diversified support for teaching and learning, significantly enhancing students' language abilities and cultural understanding. In various teaching activities, LLMs serve not only as comprehensive assistants for teachers but also as continuous cultural mentors for students.

As intelligent entities participating in foreign language teaching alongside teachers and students, LLMs are subtly transforming educational paradigms. Foreign language education must keep pace with the times, constructing new educational frameworks supported by various intelligent technologies (Kong, 2024). This trend places higher demands on foreign language teachers, who need to continuously improve their technological literacy and learn how to leverage large models to enhance the effectiveness and efficiency of language instruction.

At the same time, we should be clear-headed about the current limitations of LLMs. For example, the accuracy of information provided by these models requires further verification; the potential technological dependence arising from widespread use may obscure students' true proficiency levels; and the 'technological neutrality' of large language models requires human intervention to better cultivate students' critical thinking and humanistic literacy in the language teaching process.

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Investigating the sustainability of Open Universities: Models, opportunities, and challenges

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Business model; exploitation model; higher education; online university; open university; revenue model; sustainability.

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Abstract

With the increased interest towards lifelong learning and the need for a shift from traditional to open universities, several questions were raised about the sustainability of open universities in this rapidly changing technological era and the ongoing geopolitical tension worldwide. To address this research gap, this study conducts a focus group discussion with nine open university leaders on sustainability models, opportunities and challenges of open universities. The results reveal that most of the open universities rely on government funds, which is considered the

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most guaranteed yet fragile model, in addition to tuition fees. The results further reveal that open universities go beyond the financial dimension to also cover technological and pedagogical dimensions when sustaining themselves, where most open universities are relying on their own developed software, open-source software, and Open Educational Resources to reduce course development costs.

Introduction

Open universities (OUs) are higher education institutions that provide flexible, distance, open-access learning models, and registered-access learning models, removing traditional barriers to direct university entry (namely, age, prior qualifications, and geographic location). Today, they typically rely on technology-enhanced learning settings (namely, online learning portals, repositories, video-conferencing tools, Artificial Intelligence (AI)-based assistants, multimedia resources, etc.) and emphasize lifelong learning opportunities for diverse populations (Bozkurt et al., 2025; Peters, 2010; Tait, 2018).

To be sustainable means to be able to meet the needs of the present and continue to evolve with the changing needs in the future. Looking back at history, OUs managed to survive the suspicion and resistance from traditional, in-person universities in their early days because they were complementary to their campus-based counterparts. The mission of OUs was articulated by the far-sighted, clear-headed Lord Crowther, who was the first Chancellor of The Open University of the United Kingdom (personal communication, April 23, 1969): "The Open University is not the rival of the existing Universities. It is designed to take over where they are compelled to leave off". Even today, OUs are not in a position to compete with campus-based universities in some aspects, such as facilities (e.g., labs); however, in other aspects, such as access to remote learners and academic staff, traditional universities struggle to offer the flexibility of delivery offered by open and/or online universities.

The disruptions of the COVID-19 pandemic forced a rapid and widespread shift to online learning, compelling many traditional education providers to offer digital courses for the first time (Bozkurt & Sharma, 2020; Stracke et al., 2022). This emergency pivot expanded access to online education, normalizing virtual delivery across diverse institutions and blurring the traditional distinctions between conventional and distance learning. For open and online universities (previously distinguished by their expertise in digital pedagogy and flexible, remote access), their unique selling points were both validated and challenged. While their long-standing experience positioned them as leaders in the field, the broader adoption of online modes by mainstream institutions intensified competition and reduced their exclusivity in offering flexible, scalable learning experiences.

We are now in a period of adjustment to the "new normal". Several OUs remain successful at scale and can compete with conventional universities in many areas. However, globally speaking, this is not the norm. To be complementary means to be distinct. That is, OUs should not be modelled on their in-person-based counterparts if they want to survive; they should develop their unique advantages and give full play to these advantages.

Historically, Lord Crowther's four-open principles, which he outlined for the Open University, emphasize openness to people, places, methods and ideas (Crowther, 1969). These principles were intended to distinguish OUs from traditional universities and set out a vision where "every new form of human communication will be examined to see how it can be used to raise and broaden the level of human understanding" (Ibid). These principles remain relevant today according to Xiao (2025) who argues that, guided by the four-open principles, OUs should look for new sources of enrolment while continuing to serve the disadvantaged (open to people), further reduce physical barriers to enhance access, openness, and flexibility (open to places), avoid over-technologizing pedagogy by taking a contextualized approach to methods (open to methods), and "accelerate curricular reforms, utilize new pedagogies or appropriate technologies, and produce new knowledge through research to enhance their image as a higher education institution" (Xiao, 2025, p. 14).

Several scholars have advocated the shift from traditional universities towards OUs as they are more cost-effective for governments compared to traditional universities and they offer the opportunity to broaden access to university education for a larger population (Laidlaw & Layard, 1974; MacKeogh & Fox, 2009). However, OUs still undergo various challenges to sustain their structure and function. They usually rely on a business model which describes how an organization creates, delivers, and captures value (Osterwalder & Pigneur, 2010). As highlighted by Rafi and Abdullah (2024), a comprehensive business model framework for Open Universities should include revenue generation (e.g., tuition fees, government subsidies), cost management (e.g., course development, infrastructure), and value propositions (e.g., accessibility, employability-focused curricula). OUs traditionally relied on government funding and low tuition fees to uphold accessibility. However, austerity measures, reduced public spending, competitive advantage, and innovation have pressured institutions to diversify income streams (Orr et al., 2019). Teece (2018) highlights that dynamic capabilities—such as adapting to technological shifts—are critical for business model resilience. Tait (2018) identifies three dominant revenue models for OUs: (1) Public Funding-Dependent: Common in Europe, where state subsidies cover operational costs, enabling low student fees; (2) Hybrid Models: Combining government support, tuition fees, and ancillary services (e.g., consulting, certification programs); and (3) Market-Driven Models: Institutions in emerging economies increasingly partner with private firms to offer vocational training, often at a certain fee (Unterhalter et al., 2019).

Elaboration of different strategic approaches is reflective of both differences in context and the iteration of delivery mechanisms in response to new (particularly digital) technologies in search of a competitive edge. Olcott (2024) argues that "the unique innovations of scaling, massification and social access, whilst still essential and important for open universities, may not in themselves be sufficient to preserve and reposition open universities as major leaders in the emerging higher education ecosystem" (p. 1). To this end, he maintains that OUs should have "a renewed and/or new focus on" the following six areas: leadership, development of mega-universities and global consortia, repositioning themselves within the mainstream higher education landscape, new streamlined models of OUs, focus on national mission and renewed partnerships, and tracking development of cutting-edge technologies such as artificial

intelligence (AI) (Olcott, 2024, p. 1).

Several studies were conducted to discuss the sustainability of universities generally (Xu et al., 2024) or the sustainability of open education approaches, including Open Educational Resources (Tlili et al., 2023) or open textbooks (Cox et al., 2022). However, no research, to the best of our knowledge, has directly compared the sustainability models of various OUs worldwide. To address this research gap, the present study builds on a two-day hybrid workshop co-organized by two OUs in China and Canada, where several leaders and researchers from various OUs worldwide discussed the sustainability models adopted in their context, among other topics beyond the focus of this study. Specifically, the following two research questions (RQs) guided our study:

> **RQ1**. What are the sustainability models adopted by open universities to sustain their working mechanism?
>
> **RQ2**. What are the challenges faced by open universities in their adopted sustainability models?

Methodology

Research context and participants

An international two-day hybrid workshop jointly organized by two OUs in China (Open University of China) and Canada (Athabasca University) was hosted in March 2025 to discuss different topics related to open universities, including sustainability models, the focus of this study. Nine open university presidents and researchers participated in this workshop. Each of them had to present case studies and sustainability models applied by their university. Their insights were then gathered and analyzed.

Data collection and analysis

This study follows a qualitative research approach. Particularly, focus group discussions were conducted to collect data. They are considered the most commonly widespread technique in social sciences (Akyıldız & Ahmed, 2021). Focus group discussions provide authentic environments since participants influence one another and are influenced (Casey & Krueger, 1994). Such influence and interaction among participants can create some synergy which could reveal more insights (Stewart & Shamdasani, 2014). All participants involved in the focus group discussions gave their explicit consent for the data collection process. Each participant has been fully informed about the nature, purpose, and scope of the data collection and has agreed to participate under these terms.

In line with the aforementioned research questions, the nine panelists (representatives of the nine OUs) were asked to: (1) elaborate on the sustainability models applied in their OUs and (2) identify the different challenges faced in terms of sustainability. In addition to the documents (presentations, case studies) provided by the participants during the workshop, their interactions (for two hours) were also recorded and analyzed. Accordingly, thematic analysis was conducted where all inputs were analyzed according to two themes, namely: (1) applied sustainability models by each open university; and (2) the different challenges faced by open universities when sustaining themselves. Finally, the outputs from each theme were then summarized and presented, as discussed in the next section.

Results and discussions

The results are presented and discussed according to each of the aforementioned research questions.

Sustainability models adopted by open universities

Tuition Fees and International Students and Global Expansion: Tuition fees remain the primary revenue source for most OUs. For instance, both the Open University of the UK (OUUK) and the University of South Africa (UNISA) maintain their operations by charging tuition fees. In the University of the Philippines Open University (UPOU), undergraduate programs remain tuition-free by virtue of a law (RA10931), while graduate programs, which constitute more than 80% of degree program offerings, charge tuition fees.

Additionally, many OUs are expanding their reach by offering programs to international students. This not only diversifies their revenue streams but also develops their global reputation. International students constitute about two percent of enrollment at Athabasca, and the number has shrunk somewhat in recent years. This may be due to a tuition freeze in Alberta, Athabasca's home province, persuading the university to raise fees for international students. At OUUK, international students constitute about five percent of enrolments. Universidad Internacional de La Rioja (UNIR, Spain) is the largest and more de-centralized university in Spanish, worldwide, with over 155,000 enrolled students, from over 120 countries. It is also the university with the largest academic offer in the world, in-person or online-based, with over 700 academic programs. UNIR gets no official subsidy and it is fully operational thanks to, exclusively, tuition fees. Part of that tuition goes directly to open-access learning programs and Open Educational Resources (OERs), such as UNIR OpenEd, TV UNIR, and policy development (on Open Education, on Ethical Artificial Intelligence) (UNIR 2023a, 2023b).

Government Funding and Subsidies: Many OUs receive significant funding from the government to sustain their operations. The UPOU is a prominent example of how government subsidies can significantly influence the affordability and accessibility of higher education. This financial support allows the UPOU to maintain its mission of providing open and flexible education to a wide range of students, including non-traditional learners and those from disadvantaged backgrounds. The government subsidies not only reduce the financial burden on students but also ensure the university's ability to deliver high-quality education at scale (Garrett, 2016; Lu & Gao, 2022). In addition, Anadolu University can be given as an example of a university that

continues its activities with government funding. Anadolu University can be considered a different case in that it generates its own income sources in addition to government funding, thereby creating a sustainable business model (Bozkurt, 2025). However, while this was the case for OUUK in the past, it is not any more.

Funding from scientific research institutions/organizations: The OUUK distinguishes itself as a higher education institution through its diversified research funding ecosystem. This system operates across two primary dimensions: national-level funding bodies and supranational project-based investments. At the national level, the university receives institutional support from sources such as Quality-related Research (QR) funding, which sustains core academic activities, and the UK Research Partnership Investment Fund (UKRPIF), which facilitates infrastructure development. Concurrently, scholars actively engage in competitive grant-seeking by submitting proposals to UK Research and Innovation (UKRI), the European Research Council (ERC, even when OUUK is not part of the European Union), and philanthropic or commercial entities (Lu & Gao, 2022). Further, Universidad Internacional de La Rioja (UNIR) provides a combined funding structure where research projects are usually co-funded by external sources (i.e., European Commission, ministries of education or innovation, private contractors, etc.) and the university itself. The UPOU also follows this model by receiving additional funding from various agencies like the Department of Science and Technology.

Institutional Network and Membership: There are many university networks, worldwide. For instance, Open Education Resource universitas (OERu) collaborates with a diverse range of universities and higher education institutions, including both open and distance learning (ODL) specialists and conventional institutions. Notable partners include the OUUK, Open University of Catalonia, Southern New Hampshire University, University of Southern Queensland, and Athabasca University. Membership in OERu is divided into two levels: (1) Gold Membership costs USD 5,000 annually (or USD 4,000 with a three-year commitment) and requires 0.2 FTE of staff time. Gold members can bid to develop new courses using surplus OERu funds; and (2) Silver Membership costs USD 8,000 annually with no staff commitment. All member institutions are required to contribute at least two OER courses, fostering a collaborative environment for course development and sharing (Garrett, 2016). Further, the International Council for Open and Distance Education (ICDE) follows a similar approach with a membership. However, many other networks work as invisible colleges (Webster, 1974), de facto, with no membership fee, such as the Knowledge Equity Network (KEN), Global OER Graduate Network (GO-GN), and the Network on Artificial Intelligence and Ethics. They complement the open access approach with a free access vision, thanks to the self-funded work of their members.

Service providers: OUs can also integrate diverse social educational resources to establish a new business model that combines educational service provision, learning platform operation, digital resource development, and resource distribution channels. Through the integrated and diversified operation of "universities, educational groups, e-commerce, and financial services," open universities can adopt either a retailer model or a supplier model. High-profit products/services are at the core of transforming the revenue model for OUs. Offerings such as professional qualification certifications, innovative e-learning tools, and lectures by renowned educators, due to their uniqueness and high added value, can significantly alter profit margins (Zhang & Nan, 2015). These products are not only widely praised and sought after by learners but can also generate substantial income for OUs. For instance, professional qualification certifications, closely aligned with industry demands, meet the career development needs of learners. Innovative e-learning tools can enhance the learning experience through technological advancements, while lectures by star teachers can attract a large user base through the appeal of renowned educators. Another example is from the Open University of Malaysia which provides, as part of its services, the renting of classrooms or the Amphi for organizing scientific events, such as conferences. As service providers, UPOU conducts training programs to contribute to financial sustainability, but the training fee is balanced with the public service function of the university to make those training programs still accessible to the universities that need them.

Donation: Philanthropic donations have long served as a critical supplementary funding source in global higher education systems. A prominent example is the OUUK, where trust companies and corporate partners emerge as major donor groups. These entities contribute significantly to the institution's financial ecosystem, complementing traditional funding streams such as government grants and research contracts (Lu & Gao, 2022).

Consortium: Several universities are part of a larger consortium that handles the university's OER-related activities. For instance, the Open University of Malaysia is part of a consortium of eleven public and private universities that share courses and revenues (Garrett, 2016).

Brand building: It has become an essential strategy for OUs to navigate market competition by developing and selling their own solutions. Three key factors drive this process, namely competition and efficiency, choice and diversity, and the promotion of managerial principles. These elements collectively form the core logic of brand building for OUs. The Open University of Malaysia, for instance, has developed its own educational resources and learning management systems that are not only used at the university level but also sold at a national level. Another key insight has to do with outreach and recruitment strategies. Most of the students who joined Al-Quds Open University (QOU) learned about it through family networks (32.2%) or their own visits (19.6%). Thus, community-based marketing is still highly effective. OUs should strengthen such localized, trust-based outreach approaches as part of their broader digital and international recruitment efforts.

Sponsorship and partnership with industry: The PPP (Public-Private Partnership) model, as an innovative business framework, has been widely adopted in the education sector. At the same time, the PPP model has strong practical

significance for the development of OUs, which can share the cost of running schools by introducing social capital through the PPP model. Among the OUs PPP models, the BOT (Build-Operate-Transfer) approach is particularly prevalent and is often referred to as a "concession agreement." In higher education institutions, the BOT model is primarily applied in new campus construction and training base development, with a few cases extending to information technology infrastructure and comprehensive operational management. For example, the UPOU adopts this sponsorship and partnership sustainability model by working with various agencies/organizations like the Asian Development Bank for the development of courses that will help the Business Process Outsourcing industry in the Philippines. It also works with UNICEF-Philippines for the development of course on child rights promotion and protection. The Open University of China (OUC) collaborates with various industry partners, such as iFLYTEK and Huawei, to advance digital education.

Freemium and subscription: The OpenLearn platform exemplifies a business model in the OUUK through its strategic integration of free foundational content and value-added service conversion, achieving financial sustainability without direct subscription fees. Over 1,000 free courses, interactive activities, and multimedia resources significantly lower entry barriers for learners. High-quality free resources act as a funnel to attract potential users, indirectly driving enrollment in paid programs at the OUUK. For instance, 10% of its 9 million annual visitors (2018–2019) clicked through to explore fee-based courses, demonstrating a "free-to-paid conversion" strategy that builds institutional trust through open content. OpenLearn's success highlights the viability of a hybrid model of "freemium subscriptions" in OER (Garrett, 2016).

Coursera, a for-profit company with an initial $22 million investment from venture capital firms such as Kleiner Perkins (Yuan & Powell, 2013), is one of the leading massive open online course (MOOC) platforms that has developed a diversified business model to sustain its operations and expand its offerings. Coursera's core revenue stream comes from certification fees: free learning courses, paid certificates (such as completion certificates or specialization certificates) designed to provide learners with in-depth knowledge and practical skills in a specific area, and a fee to complete the specialization, usually a few hundred dollars. The model has proven to be very popular among learners seeking a career-oriented education, and the Open University can also refer to the case studies to offer free subscription-based courses (Bralić & Divjak, 2018).

The sustainability model for subscription of e-resources also plays a very important role in OUs and is explored in detail in the case of IGNOU. The main business models of publishers are annual subscription and ownership (purchase) models. Under the annual subscription model, libraries pay a fixed annual fee for access to the content, which is similar to the subscription renewal of journals; under the purchase model, libraries pay a one-time fee to own the content in perpetuity, and some publishers also charge annual server maintenance and access fees. Pricing, content coverage, and access rights vary by publisher; for example, Springer offers perpetual access, and the 2007 package includes the 2005 and 2006 books at no cost, but the entire subject package must be purchased; Wiley offers two licensing options, an annual subscription with the ability to add content, perpetual ownership with archival rights, and a minimum subscription of twenty e-books (Tripathi & Jeevan, 2008).

Table 1 summarizes the revenue models of the OUs participating in this study (see Appendix).

Challenges faced by open universities

OUs confront multifaceted challenges in sustaining their business models, driven by financial, technological, and competitive pressures. Four themes have been identified below as the key challenges that surfaced in the workshop discussion:

Over-reliance on public and traditional funding: Many OUs depend heavily on government subsidies and tuition fees, making them vulnerable to policy shifts. For example, the OUUK faced budget cuts amid reduced public funding, forcing it to downsize staff and programs. Similarly, Athabasca University in Canada struggled to balance costs after provincial funding reductions (Latchem, 2019). Additionally, while OUs aim to promote lifelong learning, they are strongly influenced by the mainstream political perspectives. For instance, the Ministry of Education (MOE) approved the Open University of China's (OUC) reform package in 2020. This allows OUC to become a main platform of lifelong education, a main platform of online education, a platform of flexible education, and a platform for international cooperation (MOE, 2020). Xiao et al. (2025, p. 188) stated that "the Lifelong Education Platform (https://le.ouchn.cn/home) was open to the public in 2022, the same year when OUC launched the Seniors University of China (SUC) (https://lndx.edu.cn/) as part of the national strategy to cope with the aging society."

Policy regulations and geopolitical tension: The ongoing geopolitical tension worldwide is affecting the sustainability and business models of universities generally and OUs particularly. For instance, the OUUK has been dropped from EU project funds due to the politics of Brexit. Also, QOU suffered from limited international funds due to the ongoing wars in Palestine. Cross-border accreditation hurdles limit open universities' global expansion. For instance, African OUs like UNISA face regulatory challenges in offering programs across continents (Mays, 2020).

Competition and Efficiency: Compared to traditional universities, the educational market for OUs is more open and faces fiercer competition. The primary goal of this competition is to attract more students, as their revenue models rely on tuition fees. Therefore, to enhance their market competitiveness, OUs must focus on improving educational quality and service standards. This approach not only strengthens their market position but also ensures long-term sustainability in a highly competitive environment.

Loss of technological advantage: Traditionally, the success of OUs owed a lot to the innovative use of technologies, technologies which were accessible and affordable both to OUs as institutions and their individual students and which were not used to deliver instruction at a large scale by conventional universities. Therefore, OUs could serve those when campus-based universities could not or would not. Sustainable technology-based education is predicated on two conditions: quality assurance and cost effectiveness/affordability, which OUs were able to meet in the early years. In other words, technology gained OUs an advantage over their campus-based counterparts. Nevertheless, OUs have lost this technological advantage in the digital age. Digital technologies including AI are expensive. Are these technologies equally accessible and affordable to OUs around the world and, no less importantly, to individual students of OUs? The cost-effectiveness of digital education for OUs has yet to be empirically verified. What is more, as argued by Xiao (2024), the affordances of digital technology for OU education "are hardly distinguishable from those for campus-based higher education" (p. 18). If they can enhance the openness of OU education or improve the quality of OU education, they will work equally well for campus-based education. In this case, two key challenges become evident: What are the advantages of OUs? In what ways are OUs complementary to conventional universities today?

Conclusions, implications, and future directions

This study explores the sustainability models of OUs and the challenges they face. With the rapid development of digital technology and the trend of marketization in higher education, OUs, as important institutions providing flexible education, are facing multiple pressures such as intensified market competition, technological innovation, and financial sustainability in terms of their revenue structure and business model. Tuition fees and government subsidies are the core sources of revenue, while scientific research funds and donations serve as supplements. In addition, OUs further diversify their sources of revenue through international students and global expansion. It is also evident that sustainability models of OUs call on institutions to go beyond the financial dimension to also cover technological and pedagogical dimensions, where most OUs are relying on their own developed software, open-source software, and OER to reduce course development. Furthermore, OUs can sustain themselves through not only financial and technological dimensions but also socio-cultural and community dimensions.

However, when implementing these sustainability models, OUs also face many challenges, including the diversification of revenue sources, geopolitical tensions, and the instability of policies. To address these challenges, OUs need to adopt diversified strategies, including strengthening technological investment, expanding international cooperation, and developing high-value-added educational products and services. There is also a need to develop policies that will assist OUs in conflict-affected societies (e.g., QOU). In the future, OUs should continue to explore innovative sustainability models, combine technological progress with market changes, and ensure their competitiveness and sustainable development capabilities in the global education market. By continuously optimizing their sustainability models, OUs can better fulfil their mission of providing high-quality, flexible, and affordable educational opportunities for non-traditional student groups.

The findings of this study contribute to the literature from a theoretical and practical perspective. Theoretically, it not only enriches the business model theory of open education by validating the educational-economic value of "freemium-to-premium conversion" models, but also advances institutional complementarity theory by demonstrating the necessity for differentiated complementary relationships between OUs and traditional higher education institutions. Furthermore, it refines the dynamic capabilities framework by revealing how core competencies like technological adaptation and resource integration are crucial for institutional sustainability. Practically, the research proposes concrete optimization solutions such as "free-to-paid conversion funnels" and develops a technology roadmap encompassing intelligent analytics systems, blockchain credentialing, and educational metaverse platforms.

Future research should explore longitudinal case studies, comparative analyses across regions, and the impact of emerging technologies (e.g., generative AI) on pedagogical and economic models. By addressing these gaps, scholars and practitioners can better navigate the evolving landscape of open higher education.

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Appendix

Table 1. Sustainability models of open universities.

Open Universities Sustainability models	Athabasca Univ, Canada ***(public Univ)***	Open Univ of China ***(public Univ)***	Tianjin Open University, China ***(public Univ)***	Open Univ of Malaysia ***(privately owned by the gov)***	Al-Quds Open Univ, Palestine ***(public Univ)***	Open Univ of the Philippines ***(public Univ)***	UNIR, Spain ***(private Univ)***	Anadolu Univ, Türkiye ***(public Univ)***	Open Univ of the UK ***(public Univ)***
Government fund	X	X	X	X	X (before but not anymore)	X		X	X (Research funding only)
Tuition fee	X	X	X	X		X (graduate)	X		X
National/international grants and projects		X			X	X	X		X
Freemium and subscription	X								
Provide services (consultancy, training, course development, LMS, renting facilities, etc.)				X	X	X (Training programs; renting facilities; consultancy)			X
Sponsorship and Partnership with industry		X	X	X	X	X (to implement special projects/programs)	X		X
Donations					X				X
Consortium approach				X					
Brand building				X	X				

Note: The universities are ordered alphabetically by country.

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Perceived influence of GenAI on student engagement in online higher education

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Abstract

This paper analyses the perceived influence of Generative Artificial Intelligence (GenAI) on student engagement in online higher education using the Self-Determination Theory (SDT) framework. Drawing on qualitative data from 27 experienced academics across the Australian tertiary sector, the study investigates the perspectives of online educators on how GenAI may influence three core psychological needs that are considered central to student engagement: autonomy, competence, and relatedness. The findings reveal that GenAI can enhance student autonomy through personalised learning opportunities, improve competence through real-time feedback and writing support, and support relatedness by enabling inclusive participation for linguistically diverse learners. Nevertheless, the study also identifies key risks, including over-reliance on GenAI, diminished critical thinking, reduced interaction with peers and instructors, reduced collaboration, and concerns around academic integrity. The paper argues that to harness GenAI's pedagogical potential, higher education institutions must integrate GenAI literacy, student-centred instructional design, and actionable ethical frameworks. With such measures in place, GenAI can evolve from an emerging tool into a major driver of engagement, inclusion, and transformational learning in higher education.

Introduction

In recent years, the landscape of education has undergone a profound transformation, largely driven by advancements in technology. One of the most significant developments in this era is the rise of Artificial Intelligence (AI) and its increasing integration into the classroom. Among the various types of AI, Generative Artificial Intelligence (GenAI) stands out for its ability to create content, engage in conversation, and facilitate personalised learning experiences (Giannakos et al., 2023; Ruiz-Rojas et al., 2023). As educational institutions strive to enhance student engagement, the role of GenAI has become a focal point for research and innovation. The emergence of GenAI has catalysed a fundamental shift in educational paradigms, particularly in enhancing student engagement. As AI-driven applications become more integrated into educational practices, they present both opportunities and challenges that necessitate careful examination. The adoption of GenAI is not just about introducing new technologies; it is reshaping the dynamics of teaching and learning. This transformation is marked by personalised learning experiences that adapt to individual student needs, potentially supporting engagement and motivation (Sauder, 2024). Moreover, these tools prompt students to engage in metacognitive processes, encouraging critical reflection on their interactions with GenAI, which in turn cultivates a deeper understanding of the subject matter (Chen, 2023).

Though a limited number of empirical studies focus on how GenAI influences the motivational basis of student engagement (Cao et al., 2023; Chiu et al., 2025), there is a lack of empirical research on the perspective of online educators. Existing studies have largely examined GenAI's role from the learner perspective or have focused on specific functional affordances of GenAI tools such as writing assistance and adaptive feedback without critically synthesising how these intersect with established core psychological needs frameworks such as SDT. Moreover, while prior research acknowledges both the benefits and risks of GenAI (Aghaziarati et al., 2023; Rasul et al., 2023), few studies have integrated these insights into a theoretically grounded and context-specific analysis of how GenAI shapes the three core psychological needs, namely autonomy, competence, and relatedness in online higher education. This gap is significant because online educators play a central role in mediating online educational technologies and shaping the conditions for student engagement, yet their voices remain underrepresented in the discourse. In this study, SDT is applied not as a direct measure of students' lived experiences, but as an interpretive framework to examine how educators perceive GenAI's influence on the core psychological needs of autonomy, competence, and relatedness. This approach acknowledges that the findings reflect educators' interpretations, which may differ from students' own accounts. Accordingly, the study offers insights into how experienced online academics conceptualise GenAI's potential to support or hinder these psychological needs.

The integration of GenAI into educational contexts signifies more than a passing trend; it represents a profound shift in pedagogical approaches and offers many opportunities to enhance performance both for students and educators. Recent studies underscore the potential of AI to support and enhance learning, particularly in promoting student autonomy. Tools like ChatGPT, Gemini, Anthropic's Claude, Perplexity, and the Chinese GenAI tools (e.g., Doubao, DeepSeek, Ernie Bot and Kimi Moonshot) assist students in generating ideas, improving writing skills, and conducting independent research, thus promoting a self-directed learning environment. Abbas et al. (2023) emphasise that this personalised support, tailored to individual learning needs, can significantly enhance educational performance. GenAI tools not only respond to students' queries but also provide them with the tools to think critically and independently, making them active participants in the learning process.

GenAI's role extends beyond mere content delivery; it actively supports the writing and creative processes, an area that has generated considerable debate in the educational community. Barrett (2023) highlights the benefits of using GenAI as a writing tool, noting its ability to facilitate brainstorming and cognitive offloading, which students and educators have found beneficial. The efficiency and effectiveness of these tools in aiding writing and research tasks can help students refine their ideas and improve their academic work.

GenAI also promotes deeper engagement by creating interactive, personalised learning experiences. AI-driven chatbots and virtual assistants can engage students in real-time conversations, helping them with homework, explaining difficult concepts, or encouraging exploration beyond the curriculum (Chan & Hu, 2023; Oliveira, 2023). These tools create a dynamic learning environment where students are not passive recipients of information but active participants. Furthermore, GenAI platforms can be used to generate quizzes, simulations, and study guides that adapt to students' specific learning needs, ensuring they remain engaged and challenged at an appropriate level (Oliveira, 2023). This personalised approach is especially beneficial in large classrooms, where individual student needs are often overlooked.

Despite the numerous advantages of GenAI in educational settings, there are also significant drawbacks and ethical concerns that need to be addressed. One of the primary concerns is the potential for over-reliance on GenAI, which can lead to a decline in critical thinking and independent learning. As noted by Asad et al. (2024) and Thüs et al. (2024), excessive use of GenAI tools may cause students to bypass critical thinking and may even lead to misinformation, especially if the outputs are not rigorously vetted. This raises concerns about the authenticity of student work and the risk of GenAI-generated content being used to complete assignments without proper analysis or reflection.

The issue of academic integrity is another significant challenge. The potential for students to simply cut and paste GenAI-generated content into their assignments raises critical questions about the authenticity of student work. As discussed by Barrett (2023), while GenAI can facilitate brainstorming and content creation, there is a danger that it could be misused, especially if students are not guided to engage meaningfully with the content.

Given these opportunities and challenges and the role played by the educators, this paper seeks to address the following research question:

- RQ: How do online academics perceive the influence of GenAI on student engagement through the lens of students' psychological needs of autonomy, competence and relatedness?

By exploring this question, this paper aims to contribute to the ongoing discourse on how best to harness the potential of GenAI in education, ensuring that its integration leads to meaningful and ethical learning experiences.

Literature review

This section reviews existing research on how the integration of GenAI into education is perceived to have influenced core dimensions of student learning, particularly student engagement. The theoretical framework of Self-Determination Theory is applied to examine research on how GenAI can possibly impact students' psychological needs of autonomy, competence, and relatedness in an online learning environment. The review highlights both the opportunities and challenges of using GenAI to create more personalised, responsive, and motivating learning experiences. It also considers important ethical and pedagogical implications.

The relationship between student engagement and GenAI

Artificial Intelligence (AI) is progressively redesigning the educational landscape, offering new pathways to enhance student engagement (Nguyen et al., 2024). Student engagement, a multidimensional concept involving behavioural, emotional, and cognitive involvement in learning, is a strong predictor of academic success and preservation (Bonet & Walter, 2016). AI proposes a favourable avenue for assisting and improving this engagement through personalisation, real-time feedback, and dynamic learning conditions that adapt to students' needs (Bhatia et al., 2024). One of the most substantial ways AI advances engagements is through personalised learning (Ayeni et al., 2024). Traditionally, educational models often struggle to address diverse student needs, and AI-integrated adaptive learning approaches propose a solution by investigating student data and tailoring content accordingly. For example, platforms like Squirrel AI in China use algorithms to assess individual student performance and adjust the difficulty and pacing of learning materials. This level of personalisation helps to keep learners within their zone of proximal development, which increases motivation and sustained attention. As Holmes et al. (2019) note, personalisation through AI can significantly enhance learners' sense of autonomy and competence, both of which are critical to intrinsic motivation.

In addition to personalisation, AI technologies can provide real-time feedback, which is critical for maintaining student engagement. Feedback allows learners to understand where they are in the learning process, what they need to improve, and how they can progress. This rapid feedback loop supports a growth mindset by showing students that mistake provides opportunities for learning and growth rather than fixed failures. Luckin et al. (2022) highlight that timely, actionable feedback is a core indicator of student engagement and academic achievement. AI provides more interactive and responsive learning environments. Chatbots, virtual tutors, and conversational agents can simulate peer or instructor interaction, offering on-demand support and clarification. These tools are particularly effective for students who may be hesitant to ask questions in class or who require additional explanation outside normal teaching hours. AI systems capable of natural language processing can enhance learner engagement by enabling more exploratory and dialogic forms of learning (Zawacki-Richter et al., 2019). For instance, students interacting with AI writing assistants often experiment with different ways of communicating and articulating their ideas, which can lead to deeper understanding and increased investment in the writing process. Saliu (2024) emphasised the importance of engagement with GenAI as it becomes a critical factor of modern media literacy. Learners must be trained not only to understand AI as a non-human media actor, but also to significantly pilot its role in defining online communication and participation.

Research highlights the role of AI in developing students' academic skills, particularly in writing. Lee and Kwon (2024) found that students who engaged actively with GenAI produced essays with greater verbal sophistication and complexity than those who used the tool inactively. This indicates that meaningful engagement with AI tools can persuade higher order thinking especially when students are steered to comment and build upon the AI's suggestions rather than simply accept them. Similarly, Sullivan et al. (2024) emphasised that engaging students through targeted GenAI workshops enhances their self-confidence, intentional use, and critical knowledge of AI tools in academic contexts, emphasising the growing importance of AI literacy in education. Student engagement with GenAI is needed for developing the AI literacy and critical thinking skills needed to thrive in a workforce progressively shaped by emerging technologies (Damaševičius, 2024).

Despite these advantages, the integration of AI in education is not without problems. Ethical concerns such as data privacy, algorithmic bias, and over-reliance on automation need to be addressed to ensure that AI use supports, rather than undermines, equitable student engagement (Akgun & Greenhow, 2022). AI indeed presents a powerful tool for improving student engagement when used thoughtfully and ethically (Ghotbi et al., 2022). Its role to personalise learning, deliver real-time feedback, and create responsive, interactive learning environments aligns well with modern pedagogical objectives (Diaz & Nussbaum, 2024). While challenges remain, specifically around ethics and fairness, the capability for AI to advance more meaningful, inclusive, and motivating learning experiences is substantial. As educators, researchers, and policymakers continue to investigate AI's role in education, continuing a focus on student engagement will be critical to realising its full potential. Engaging students with GenAI must go beyond tool usage to include critical

AI literacy that challenges prevailing myths, directs ethical concerns, and steers learners to navigate the social and educational impacts of these technologies in a responsible manner (Rudolph et al., 2025).

Self-determination theory and student engagement

Student engagement is essential to academic accomplishment, involving the emotional, cognitive, and behavioural capabilities that students develop in their learning processes (Kimbark et al., 2017). A pronounced framework for understanding engagement is Deci and Ryan's Self-Determination Theory (SDT), which signifies three core psychological needs: autonomy, competence, and relatedness (Chiu, 2022). These needs are necessary for fostering intrinsic motivation and positive engagement in educational contexts (Sergis et al., 2018). When students feel independent, competent and connected (with peers and instructors), they are more likely to be deeply engaged in their learning (Sun et al., 2017). This theoretical framework provides a useful lens to examine the influence of GenAI on the motivational foundation of student engagement from an online educator's perspective.

Autonomy: Empowering student choice

Autonomy refers to the capability of students to feel that they are in charge of their learning processes. Autonomy is an essential factor in intrinsic motivation and when students have the freedom to make choices about their learning, they are more likely to engage deeply and take ownership of their academic journeys (Al-Shboul et al., 2023). Autonomy in an education setting could be reflected in numerous ways such as through freedom to select and complete study topics, engage with academic content in a personalised manner and design projects to complete main assessment activities. When the student's learning is in line with their values, it results in a sense of ownership and control that drives engagement.

In the classroom, autonomy can manifest in various ways, such as through the freedom to select topics, design projects, and engage with content in personalised ways. When students perceive that their learning aligns with their interests and values, they experience a sense of ownership and control, which drives engagement (Jungert et al., 2023). GenAI can support autonomy through personalised learning experiences that allow students to investigate topics of interest at their own pace (Chiu, 2024). AI-driven adaptive learning platforms can adapt the complexity of tasks and provide students with resources that match their learning preferences. Tools like GPT-4, for instance, can assist students in brainstorming ideas, and even extending tailored feedback on their work. This level of personalisation enables students to make decisions about their learning process, enhancing their sense of autonomy (Xie et al., 2024). However, other researchers (Asad et al., 2024; Hou et al., 2025; Larson et al., 2024) caution that such excessive use of GenAI may adversely impact student learning as critical thinking is bypassed. This undermines genuine autonomy in students as they delegate critical thinking to GenAI.

Competence: Building mastery through feedback and challenge

Competence, the second core psychological construct within SDT, involves students feeling efficient in their learning and refers to the need to experience mastery and success in achieving challenging tasks (Sanchez-De Miguel et al., 2023). When students believe they can succeed in their academic interests, they are more likely to continue in their efforts and remain engaged. Competence is often developed through constructive feedback, achievable encounters, and opportunities to apply competencies in meaningful perspectives.

GenAI has the capacity to substantially improve the progress of competence. One of the ways this occurs is through immediate, personalised feedback. AI systems can evaluate student work and provide feedback, help students recognise where they are excelling and where they need upgrading (Song et al., 2025). AI-powered writing assistants can help students refine their writing by suggesting edits for grammar, structure, and clarity, allowing students to learn and improve their academic writing skills (Kim et al., 2025). This kind of feedback helps build competence by guiding students toward mastery in a supportive manner. Adaptive learning platforms developed by AI can present students with tasks that are neither too easy nor too difficult, but just right to facilitate learning without overwhelming them (Hess et al., 2024). By providing challenges that match a student's current competence level, GenAI can support their learning and growth and enhance student engagement. However, researchers have raised concerns about the depth of the competence with a recent study finding that the learning outcomes were lower for students who used "GenAI in a procedural and regurgitative approach" (Pallant et al., 2025, p.9).

Relatedness: Promoting connections with peers and instructors

Relatedness, the third psychological need drawn from SDT, involves students feeling connected to others and experiencing a sense of belonging in the learning setting. Social connections with peers and instructors contribute significantly to engagement, as they promote collaboration, emotional support, and a sense of community. Being involved in a supportive learning community fosters motivation and persistence to achieve higher learning outcomes (Dung et al., 2024).

AI can improve communication between students and instructors by providing platforms for personalised interactions and feedback. AI-driven virtual assistants can support instructors in managing their communication load, offering timely responses to student inquiries and creating more opportunities for meaningful and individualised communications. By facilitating more responsive communication, GenAI helps students feel more connected to their mentors and instructors, promoting a sense of relatedness (Liu et al., 2024). Furthermore, AI can support peer collaboration through platforms that boost group work, idea sharing, and collective problem-solving (Baskara,

2024). AI tools can help students collaborate on projects by organising discussions, suggesting resources, and providing feedback on group contributions. These tools can also facilitate students connect with peers who share similar interests, fostering a sense of belonging within a broader academic community. Conversely, students express concern that the use of GenAI can limit opportunities to interact and socialise with others (Chan & Hu, 2023).

The literature suggests that while GenAI has the potential to support students' psychological needs of autonomy, competence and relatedness, it poses challenges such as a lack of genuine autonomy and competence and limiting social interaction. The effectiveness of GenAI in supporting the motivational foundation of student engagement appears to need intentional pedagogical design.

Methodology

This study used a qualitative research design to examine the perception of academics in online learning about the influence of GenAI on student engagement through the lens of Self-Determination Theory (SDT). In this study, SDT is applied as an interpretive framework for analysing educators' accounts rather than as a direct measure of students' psychological experiences. This framing recognises that lecturers' insights provide an informed but indirect view of students' lived experiences, consistent with research recognising the value of educators' situated expertise in identifying engagement patterns and shaping need supportive learning environments (Kember, 2004; Manninen et al., 2022). Given that educators play a central role in shaping supportive learning environments that nurture student learner motivation (Manninen et al., 2022), the interviewees were well-positioned to offer in-depth context-specific insights into how GenAI may influence students' psychological needs, namely autonomy, competence, and relatedness. The qualitative research design was deemed appropriate to investigate the strategies employed by educators to enhance adult learners' engagement, support their autonomy, improve their competence, and promote their sense of belonging in the context of online higher education. The study followed a structured approach to ensure the reliability and validity of the data collected (Azungah, 2018). It targeted academics working in the Australian tertiary education sector with at least two years of experience in online teaching. Previous experience in online teaching is essential, as these academics have taught online courses several times and have shown an interest in developing student engagement strategies (Friedrichsen et al., 2009).

A purposive sampling technique was employed to select participants with experience and expertise in online higher education. The inclusion criteria for participants were based on their involvement in teaching online courses and their willingness to share insights on student engagement in this context. Most academics were contacted using the social media platform LinkedIn and through referrals. Several other academics were then recruited through snowball sampling to ensure sample diversity (Noy, 2008). In total, 27 academics agreed to participate in the research project, all with at least ten years of teaching experience in the Australian higher education sector and more than two years of experience in online learning. The respondents represented five higher education institutions and taught across eight distinct disciplines, including business, education, psychology, information technology, and humanities. The sample size of 27 participants was considered appropriate as data saturation was reached and the group reflected a diverse cross-section of academic roles and institutional contexts, enhancing the transferability of findings through varied, context-rich insights into how GenAI is perceived across institutions and disciplines.

Data collection

Data were collected over three months (September to November 2023) through semi-structured interviews conducted with the participants. Ethical approval was granted by the Ethics Committee at the Australian Institute of Business. Before the interviews, participants were provided with informed consent forms outlining the study's purpose, confidentiality measures, and their rights as participants. The interviews were conducted online via Zoom, recorded with the participants' consent, and then fully transcribed. The interviews, lasting 60 minutes each, allowed for a detailed exploration of the topic. The interview questions were derived from a comprehensive review of existing literature. The interview protocol consisted of 15 open-ended questions designed to explore academics' perceptions, experiences, and strategies related to student engagement in online higher education. Following general questions about student engagement and the challenges in online education, the academics were asked to share strategies they use to enhance student engagement by providing autonomy and control over their learning, improving the competence of adult learners in online higher education, and promoting the involvement of adult learners (Abayadeera et al., 2019; Harbour et al., 2015). This approach enabled the researchers to lead the discussion flexibly while allowing new research avenues to emerge (Merriam & Tisdell, 2016).

Data analysis

Credibility of the findings was supported through member checking with participants being provided an opportunity to review their transcripts and provide feedback (Birt et al., 2016). Respondents were de-identified in the dataset, and the transcripts were stored securely according to the ethics approval requirements. The qualitative data were coded using NVivo 11 and analysed using a general inductive approach (Thomas, 2006). This approach is common in various types of educational research studies (Liu, 2016). As suggested by Maxwell (2009) and Liu (2016), data coding was carried out concurrently with data collection whenever feasible, which supported the collection of rich data until no new insights could be gained. Recurring data patterns were identified by comparing data, coding, and interpretation (Chenail, 2012; Merriam & Tisdell, 2016). Initially, we established preliminary categories through an iterative process of open coding (Miles et al., 2020; Thomas, 2006). After coding 25

interviews, data reached saturation, and interviewing ceased after 27 interviews. To improve inter-coder reliability, two researchers independently coded the data using preliminary categories (Campbell et al., 2013). After the initial round of coding, the codes were refined and organised into groups based on engagement strategies (Miles et al., 2020). The research team collaboratively discussed and resolved the coding discrepancies and refined themes. This process supported consistent interpretation of the interview data and strengthened the analytical rigour of the study (Miles et al., 2020).

Results

The thematic analysis focused on the perceptions of study participants on the influence of GenAI on the core psychological needs identified by self-determination theory – autonomy, competence, and relatedness. Interview data were coded for first-order concepts and then into second-order themes. The second-order themes were mapped to each core psychological need. Collectively, findings suggest a complex dialectic relationship in the influence of GenAI use and student engagement. The tensions are reflected in the potential of GenAI to support and conversely hinder student engagement.

The influence of GenAI on student autonomy

The participants were asked to share their opinions regarding the influence of GenAI on student autonomy. Their perceptions were complex and with some opposing views. Three second order themes (as shown in Table 1) were identified, namely, technological limitations of GenAI and its integration challenges, its negative impact on learning and cognitive development, and its potential for supporting learning. Many interviewees mentioned that the development of GenAI is still at an early stage and that many people still do not know how to use it properly. Both academics and students face complexities and hurdles in effectively utilising GenAI as a learning tool.

Table 1. The influence of GenAI on student autonomy.

1st order concepts	2nd order themes
Absence of personal touch	Technological limitations and integration challenges
Just a supporting tool not to help autonomy	
Less helpful for some subjects	
Impair students' critical thinking skills	Negative impact on learning and cognitive development
Decreased engagement and attentiveness	
Reduced sense of responsibility	
Students struggle during exams due to reliance on GenAI	
May facilitate academic dishonesty if misused	
Good start for generating ideas and/or information	Potential for supporting learning
May help in grammar and sentence structure	
Tool for independent research	

Technological limitations and integration challenges

Lack of personal touch in the learning process was noted by several participants as a major limitation of GenAI. They expressed concern that while GenAI can provide valuable information, it cannot replace the tailored feedback that students receive from human instructors. This absence of a personalised learning experience can hinder students' deeper understanding and engagement with the subject matter. As an academic noted:

> They are just relying on technology for quite a lot, many things. They are losing that personal touch and communication and the learnings from the real-world scenarios which they might have got from our experiences. (Participant 11)

Applicability across different subjects varies for GenAI. Some disciplines benefit more from GenAI tools, while others find them less useful. For example, an academic teaching information technology for business found that GenAI significantly enhances student autonomy by enabling them to explore beyond the classroom content. However, for some subjects, GenAI is not a credible source, as it often provides inaccurate information, which negatively impacts learning. An academic explained:

> For other things like coding, it is accurate most of the time, and it gives them that ability or that resource to learn more than what we can cover in a two-hour lecture. But for subjects like Tax Law, it's very inaccurate. (Participant 16)

Negative impact on learning and cognitive development

Impairment of critical thinking skills due to the misuse of GenAI tools by students can diminish their ability to think independently and solve problems creatively. The findings align with recent studies that found frequent use of AI tools reduced critical thinking skills in students with cognitive offloading (Gerlich, 2025). A common theme among participants was that GenAI tools, such as ChatGPT, Gemini, Anthropic's Claude, Perplexity, and the Chinese GenAI tools (e.g., Doubao, DeepSeek, Ernie Bot and Kimi Moonsho) often provide students with theoretical answers. Many students often misuse GenAI to produce work without genuine understanding or effort; rather than engaging with the material themselves, they use AI-generated content in their assignments without critically processing the information. From an SDT perspective, students' reliance on GenAI to do the critical thinking undermines autonomy as the sense of agency is eroded. The convenience of AI tools also compromises academic integrity. The following comment echoes the sentiment of many participants.

> They just put the questions directly into ChatGPT, and it provided a very theoretical answer. They just copy-paste the answer. (Participant 3)

This reliance on GenAI can result in students becoming less attentive and less engaged in active learning, as they depend on GenAI to provide answers instead of participating in discussions and problem-solving activities. The reduction

in self-regulated learning negatively impacts a student's intrinsic motivation to learn. As one academic observed:

> I had a student in the classroom recently who very brazenly was using ChatGPT right in front of me. He would literally type it into ChatGPT and read from the screen. (Participant 5)

The reduced sense of responsibility is another significant concern. GenAI tools can make students complacent, as they may feel less accountable for their learning. According to one participant:intrinsic motivation to learn. As one academic observed:

> Students have become lazy and just use whatever AI gives them. (Participant 8)

This attitude hinders the development of autonomy and self-regulation, which are essential components of effective learning. Dependence on GenAI can also have adverse effects on students during exams, as they are unprepared to tackle questions without its aid. One participant noted:

> Some students rely on GenAI to get ideas about a concept and then try to build on that, but when it comes to exams, they struggle because they have not developed a deep understanding. (Participant 6)

Potential for supporting learning

Many participants believed that GenAI tools can be instrumental in the initial stages of idea generation and information gathering, thus serving as a useful tool for gaining a broader understanding of topics. One academic noted:

> I am not against AI, I like it. And sometimes I use it myself. I think there's obviously a lack of constructive guidance for students on how to use GenAI to support learning. For instance, in practical subjects like global business, if they can't find information on a certain company, I say, 'use AI as professional Google'. It's a tool that's very helpful for them. (Participant 1)

GenAI tools can also play a significant role in improving students' academic writing by assisting with grammar and sentence structure and produce more polished and professional work. One participant shared:

> On the positive side, GenAI helps a lot with grammar checks and sentence structuring. It's so easy to have someone helping you do that, resulting in better quality writing. (Participant 16)

Several participants noted that GenAI can facilitate independent research by helping students access and process information more efficiently, emphasising its potential to support deep learning by making research more accessible. One academic mentioned:

> GenAI has definitely helped students enhance their autonomy in research and learning. For instance, GenAI processes information efficiently and combines different ideas, providing a holistic view. (Participant 12)

Collectively, while interviewees are concerned about the widespread misuse of GenAI tools, they agree that their potential to support learning is undeniable. When used correctly, GenAI enhances student autonomy and contributes to superior learning outcomes.

The influence of GenAI on students' critical thinking and competence

Participants offered diverse perspectives on the influence of GenAI on students' critical thinking and competence, expressing both optimism and concern. Our findings underscore a fundamental challenge in contemporary education, whether GenAI is used as a tool to support inquiry-driven learning or surface-level engagement. The surface-level or deep-level processing a learner is engaged in (Marton & Säljö, 1976) depends on how GenAI is used by students. The data revealed two second-order themes (as shown in Table 2), namely challenges and limitations of GenAI as a barrier to critical thinking, and GenAI as catalyst for critical thinking and learning.

Table 2. The influence of GenAI on students' critical thinking and competence.

1st order concepts	2nd order themes
Still at the infancy stage to realise its impact on critical thinking	GenAI as a barrier to critical thinking and learning
GenAI is not built to help the user think critically	
Depending on GenAI without relying on own research may lead to a superficial understanding of concepts	
Excessive dependence on GenAI can hinder creativity	
GenAI may provide misleading information	
Impact is dependent on the context (e.g., topic, field of study, etc.)	
GenAI may serve as a catalyst for creative thinking and learning	GenAI as catalyst for critical thinking and learning
Stimulate ideas to think outside of the box	
May be useful if the correct prompts are used	

GenAI as a barrier to critical thinking and learning

Many participants emphasised that the GenAI technology is still in its infancy; while GenAI provides quick answers, it may not contribute to deeper cognitive development. A recurring view was that GenAI is not inherently designed to promote critical thinking. Instead, its use often results in broad, superficial outputs that may not help students to engage in deeper analysis. Another issue participants identified is the risk of students relying too heavily on GenAI without conducting their own research, which may lead to a shallow understanding of the subject matter. Two participants remarked:

> It is actually making work easier for most students, they tend to do less research on their own to understand the concept. (Participant 6)

> All the students who rely more on GenAI are the ones who are running short of time…They are not prepared in advance and they just rely on GenAI just to finish the assignments. (Participant 13)

This resonates with other studies that found only a small proportion of students use GenAI to improve critical thinking (Fischer et al., 2024). Several participants also cautioned that GenAI can produce misleading information, which students often students fail to verify. As two interviewees observed:

> Sometimes GenAI produce references which don't even exist or might be incorrect. But students just pick the information and submit it. (Participant 6)

> It definitely gives you a lot of information... but at the same time, it also gives information which is not relevant. That's the problem. (Participant 24)

Many interviewees also believed that the impact of GenAI on critical thinking is highly dependent on the context – it varies across different fields of study.

GenAI as a catalyst for critical thinking and learning

Several educators highlighted that it could serve a catalyst for creative thinking and learning when used effectively. They observed that while some students rely too heavily on GenAI, others thoughtfully use it to brainstorm, explore new ideas, analyse situations, synthesise diverse perspectives and obtain additional insights. Three academics commented:

> Some students use GenAI very wisely. They use AI to help them understand concepts from different perspective, analyse a situation from different angles. (Participant 12)

> It has enabled some of them to think outside the box. For those who like to know more, they look at what GenAI is presenting, compare it with what they've learned. (Participant 6)

> AI helps them to see both sides of an issue... it allows them see both sides of an issue. I think from that sense it helps them to be more creative. I think it facilitates their critical thinking. (Participant 8)

However, many interviewees shared that whether the use of GenAI would promote critical thinking largely depends on the quality of the prompts used as the output is highly dependent on the thoughtful engagement with the tool. The following comments supports this view:

> GenAI's outcome depends upon what type of prompts you are using. If you are using the right prompts, then only you will get the right result. The prompts are also related with critical thinking. You have to critically think about the prompts, otherwise, it will come up with a standard answer. (Participant 7)

> Competent students create prompts in a creative way. It's not just give me an answer. In fact, this is an art in itself. (Participant 10)

Collectively, interviews highlight that GenAI can stimulate critical thinking, but only when students engage deeply with the tool by asking precise and thoughtful questions.

The influence of GenAI on students' collaboration and sense of belonging

Perspectives of online academics reveal a dialectical tension: while GenAI can support collaboration between students, it also risks contributing to social isolation and weakening their sense of belonging. The findings suggest that the influence of GenAI on social connectedness is context-dependent on how GenAI is integrated into the learning environment. Two second-order themes (as shown in Table 3) were identified, namely GenAI as an enabler of collaboration and sense of belonging and risks of isolation and reduced collaboration.

Table 3. The influence of GenAI on students' collaboration and sense of belonging.

1st order concepts	2nd order themes
Helps students with language barriers to communicate	GenAI as an enabler of collaboration and sense of belonging
Promotes peer to peer connection	
Supports inclusive learning across language and cultural backgrounds	
Many students becoming overly dependent on GenAI	Risks of isolation and reduced collaboration
Diminished interpersonal interaction and social engagement	
May hinder teamwork	

Some educators observed that GenAI tools can assist students with language barriers (especially non-native speakers) by helping them understand the content, articulate ideas more effectively, and communicate better with peers, contributing to a more inclusive learning environment. One participant commented:

> In terms of a positive, you can think of it as a tool where you can connect with students beyond boundaries. A student who has poor English communication skills can still connect with students from an English background. Google Translate and other things can just change the meaning. They can be completely misleading. GenAI makes it better. (Participant 10)

However, many academics cautioned that while GenAI tools can support the connectedness of students with language barriers, there is a risk of students becoming overly reliant on GenAI, possibly reducing collaborative efforts. They also have the potential to make students more isolated,

diminish interpersonal interactions and weaken the sense of community among peers. Below are some comments from academics that echo the sentiments of others.

> There is a potential for making students more of loners because you have a support system, you have a friend. So, why do I have to talk to someone else? (Participant 16)

> Some students have stopped communicating to their friends…they are just focused on their laptops…Before ChatGPT, people had to talk to their group members, work together to find answers, or collaborate as a team. So, I do feel that ChatGPT has hindered students' sense of belonging. (Participant 3)

> I think if GenAI alienates them from their class….I think this is a way of getting out of having to socialise with their peers. (Participant 5)

These insights highlight that for some students, particularly those prone to social withdrawal, GenAI may become a way to avoid interaction altogether, limiting opportunities to develop vital interpersonal and teamwork skills. This shift has broader implications for educational settings, where belonging and social connection are essential to deep learning and student well-being. These insights align with the social constructivist framework (Vgotsky, 1978) that considers collaboration as central to the shared construction of knowledge.

Discussion

This study examined how GenAI influences student engagement in online higher education through the lens of Self-Determination Theory (SDT), using it as a framework to interpret educators' perceptions of its impact on the psychological needs of autonomy, competence, and relatedness. These perspectives offer an informed, though indirect, view of students' experiences. The complex dialectical relationship between the use of GenAI and student engagement was evident in the perspectives of participants in this study. It also highlights key tensions such as autonomy versus dependence, competence versus superficial learning, and relatedness versus isolation. The findings reveal that while GenAI presents opportunities to personalise and enhance learning, its impact is context-dependent, shaped by user intent, digital literacy, and ethical integration within pedagogical practice. Although this study is situated in the Australian higher education context, many of the participating academics teach in institutions with significant international student populations. This diversity enhances the transferability of the findings, making them relevant to broader global contexts. The challenges identified are not culturally isolated, but indicative of wider shifts in how GenAI is reshaping student engagement in online learning environments.

Autonomy versus technological dependence

With regard to autonomy, participants recognised GenAI tools as useful for supporting independent learning, especially through idea generation, grammar enhancement, and preliminary research. This aligns with previous research (Abbas et al., 2023; Nazari et al., 2021) indicating that GenAI can provide tailored, learner-driven support. Many academics acknowledged that when students use GenAI purposefully by selecting relevant prompts or critically engaging with feedback, their sense of control and ownership over their learning improves. However, these benefits were balanced by concerns about misuse such as over-reliance, diminished cognitive effort and academic misconduct, a theme flagged in recent studies (Chugh et al., 2025; Foltynek et al., 2023; Sullivan et al., 2023). This paradox where students are offered more choice through GenAI but often relinquish critical agency to the tool raises questions about whether such autonomy is authentic. From an SDT perspective, this blurring of autonomy and dependence complicates the notion of learner agency, suggesting that externally supported freedom without meaningful self-direction may not truly satisfy the psychological need for autonomy. The surface-level learning engaged in by most students using GenAI is an impediment to deeper learning that supports cognitive development and authentic student engagement (Fischer et al., 2024). Consistent with Yang et al. (2024), this study emphasises the need to promote student agency and argues that SDT and constructivist learning theory should inform pedagogical practices. Participants noted that GenAI is still at an early developmental stage and lacks the nuance needed to support deep cognitive autonomy. This reflects a broader issue raised by Chan and Hu (2023), Foltyne et al. (2023), Lo (2023), Sullivan et al. (2023), and Yu and Yu (2023): that institutions must embed GenAI literacy and ethical training to unlock its full pedagogical potential.

Competence versus the risk of superficial understanding

On the dimension of competence, the findings indicate that GenAI can assist in providing real-time feedback, scaffold academic writing and improve analytical capacity essential in research tasks. Such features are identified as core drivers of perceived competence under SDT. Nevertheless, these benefits were counterbalanced by concerns regarding students' passive use of GenAI, misinformation, superficial understanding of subject content, and a lack of genuine engagement or effort, often driven by the desire to complete assignments. From an SDT perspective, this disconnect may lead to a false sense of competence, where students feel efficient through GenAI-generated responses, but lack mastery, which is likely to disrupt the feedback loop necessary for genuine self-efficacy and intrinsic motivation. This compromise of meaningful learning practices risk undermining deep learning and critical thinking, a concern substantiated by recent studies (Daniel et al., 2025; Han et al., 2025; Sullivan et al., 2023; Wu et al., 2024; Zeb et al., 2024). Importantly, this suggests that effective use of GenAI requires clear usage policies, prompt literacy and academic training in how to embed GenAI meaningfully within curriculum design (Aithal & Aithal, 2024; Chugh et al., 2025; Duah & McGivern, 2024; Farrelly & Baker, 2023; Rodriguez-

Donaire, 2024). Following Biggs (2003), constructive alignment in pedagogical practice is important to support deep learning in AI-supported educational contexts.

Relatedness versus isolation

The dimension of relatedness presents divergent perspectives on the role of GenAI in promoting or inhibiting social connections and sense of belonging. On one hand, GenAI was perceived as an equalising tool that can assist students with language barriers to engage more fully in academic discourse, thereby contributing to a more inclusive learning environment. On the other hand, it was critiqued for potentially reducing interpersonal interactions and peer collaboration. This contradiction suggests that inclusivity achieved through GenAI may be functionally different from social inclusion achieved through interpersonal interaction, raising important questions about the authenticity of connection in GenAI-supported learning environments. Increasingly, students are turning to GenAI rather than classmates for discussion and clarification, which may weaken peer-to-peer social cohesion. These concerns reflect broader apprehensions that, although GenAI can facilitate communication, it may inadvertently erode students' sense of community and belonging if learning environments are not intentionally designed to support rather than substitute authentic human connection (Alasadi & Baiz, 2023; Khlaif et al., 2024; Liu, 2024; Liu et al., 2024). These findings highlight the importance of intentional pedagogical design in online learning environments that aligns with social constructivist theory (Vygotsky, 1978) and Community of Inquiry framework (Garrison & Arbaugh, 2007), both of which emphasise learning as a collaborative social process.

To address the tensions identified in the use of GenAI in higher education, the study proposes applying constructive alignment (Biggs, 2003) as a pedagogical framework, one that ensures GenAI is not used in isolation, but purposefully integrated into learning outcomes, teaching methods and assessment. Framed this way, GenAI can be used as a supportive tool to promote deeper learning, real autonomy, and meaningful student engagement.

Ethical implications and institutional responsibilities

Interviewees in this study raised concerns about academic integrity given the convenience of GenAI tools. Students can cut and paste responses from GenAI tools in their assessments. The need to provide guidelines for the ethical use of GenAI tools has been raised previously (Sullivan et al., 2023; Taylor, 2023; Watts, 2023). GenAI tools serve as an all-in-one student learning assistant that offers intelligent grading and language support for teachers, thereby creating a more enriched, interactive, and adaptive learning experience. However, to ensure proper implementation without overstepping any ethical boundaries, and acknowledging that these tools may carry embedded bias, GenAI should complement rather than replace traditional teaching methods (AlAli & Wardat, 2024; Nguyen et al., 2022).

To mitigate ethical risks, institutions should adopt clear policies on GenAI use, covering academic honesty, disclosure requirements, and acceptable boundaries in assessments. Educators can reduce misuse by designing assessments that emphasise process over product, such as scaffolded tasks, oral defences, and reflections on tool usage. Effective integration into teaching and learning also requires the development of appropriate pedagogic strategies focused on fact-checking, source validation, and critical thinking.

As GenAI technologies become increasingly prevalent, the lines between human and machine-generated content are becoming more blurred. This poses a challenge and places an onus on the educators to establish clear ethical guidelines and frameworks to govern the use of GenAI in education (Seo et al., 2021). This necessitates a heightened focus on GenAI ethics within curriculum design, preparing students to become informed users and future developers of GenAI technology (Zhang et al., 2022). This includes equipping them with the ability to evaluate GenAI outputs, understand data privacy risks, identify bias, and use GenAI responsibly. Educators have a critical role to play in guiding students toward ethical engagement with these technologies. Institutions must also ensure that the GenAI platforms they adopt are transparent, secure, and include mechanisms for accountability when errors or misuse occur.

Conclusion and future directions

This study demonstrates that the influence of GenAI on student engagement in online higher education is a complex dialectical relationship. When effectively integrated into pedagogical practice with clear instructional goals, GenAI has the capacity to support the core dimensions of engagement, namely autonomy, competence, and relatedness, through personalised learning, delivering timely and constructive feedback, creating an inclusive learning environment, and supporting communication. However, these benefits depend on thoughtful instructional design, strong GenAI literacy among educators and students, and clear ethical guidelines. To realise GenAI's full potential, institutions need to adopt a strategic approach that aligns technological innovation with educational values and learning outcomes. Rather than viewing GenAI as a replacement for traditional instruction, it should be treated as a pedagogical tool that enhances student-centred learning, deepens engagement, and supports the broader goals of higher education in a digitally mediated environment. As suggested in this study, to ensure this, pedagogical practice should be grounded in robust theoretical frameworks, particularly self-determination theory and constructivist learning theory, which can guide the meaningful integration of GenAI in higher education.

These insights highlight the need for institutional policies that govern ethical GenAI use and provide infrastructure for GenAI literacy, including faculty training and curriculum design support. At the policy level, national education authorities and accreditation bodies should establish sector-wide standards and accountability frameworks to ensure the responsible, transparent, and equitable integration of GenAI in higher education.

As GenAI continues to advance, educators must adapt their teaching strategies to effectively incorporate these tools into their curricula. This requires ongoing professional development and training to ensure that educators are equipped with the knowledge and skills necessary to navigate the complexities of GenAI in education (Lo, 2023). Furthermore, the relationship between students and GenAI is dynamic, requiring continuous reflection and adaptation to maximise its benefits while mitigating its risks (Lodge, 2023).

Future research directions emerging from this study include the following. First, further empirical studies are needed to explore how GenAI literacy and prompt-engineering skills shape students' ability to use GenAI critically and meaningfully, in ways that support autonomy and higher-order thinking. Second, given the diversity of student experiences across disciplines, research should investigate how GenAI affects engagement and learning outcomes in subject-specific contexts, particularly in fields that demand high levels of factual accuracy, such as law, medicine, or engineering, where misinformation can have significant consequences. Third, there is a need to explore newer strategies for leveraging GenAI as a tool to promote a sense of community and enhance peer collaboration in online learning environments. Fourth, future research should also examine the extent to which AI-mediated experiences of autonomy, competence and relatedness are experientially equivalent to those cultivated through human interaction, or whether SDT requires adaptation to account for the complexities of GenAI-driven learning.

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Does artificial intelligence impede critical thinking? A case study of Iranian university students

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Abstract

This study examines the way artificial intelligence (AI) impacts critical thinking among Iranian university students in relation to the ways in which it may either promote or inhibit cognitive involvement, focusing specifically on these factors. Using a mixed methods approach, the study collected responses from 348 students using questionnaires and interviewed students in greater depth to explore their perceptions of AI in decision-making, problem-solving, and bias awareness. The findings showed that students are very worried about relying too much on AI. The students who answered the survey felt that AI made them less independent or critical in their thinking, more comfortable with automation, and more biased by algorithms. Still, everyone agrees that AI literacy should be taught in universities so that students can think critically about the information AI gives them and avoid being biased. This will help with balanced cognitive engagement. This study argues that while AI can enhance decision-making, its associated dangerous effects must be managed via ethical development, education reforms, and lifelong learning initiatives to present AI as a friend of critical thinking rather than a threat.

Introduction

Artificial intelligence has become a real puzzle to the human race. On many occasions, it has outperformed human intelligence. As a significant part of human intelligence and as one of the 21st century skills (communication, creativity, critical thinking, and collaboration), critical thinking has been affected by AI.

AI can mirror human capabilities in decision-making, problem-solving, designing, learning, etc. (Kutty et al., 2024; Mohammadkarimi, 2023; Valenzuela, 2025, Vallor, 2024). The emergence of these human-like functions has raised concerns among scholars, as it may lead individuals to become less motivated to apply effort and engage their cognitive abilities in performing such tasks. In other words, AI may cause some sort of impediment to the human race to think critically. Though AI has transformed education, its impact on critical thinking is still controversial among scholars (Darwin et al., 2024; Jayasinghe, 2024; Larson et al., 2024; Muthmainnah et al., 2022). AI-powered tools, such as chatbots, offer efficiency and convenience (Ahmad et al., 2024); however, they pose risks to learners' critical thinking. If learners depend solely on AI tools to write an essay for them, the required cognitive effort to do the analytical task of collecting ideas, arranging them into coherent paragraphs, and selecting the suitable vocabulary and structure is not practiced properly. In other words, the various dimensions of critical thinking, such as analyzing ideas, creating and evaluating arguments, and decision-making and problem-solving relevant to the topic addressed by the essay, have not been adequately exercised.

De Cremer and Kasparov (2021) believe that machines powered by AI can now do complex cognitive work that can replicate the work of human minds. However, they still think those machines have characteristics such as being "fast, more accurate, and consistently rational" that outscore human beings, but they are not "intuitive, emotional, and culture specific" (p.2). This implies that though the machines have evolved to a high level of performance, they still lack very significant human-like traits that can make them as effective as human beings. As such, AI is able to take over some of the tasks and work by humans, but may not be able to replicate how humans approach these tasks fully (Popenici et al., 2023; Rudolph et al., 2024).

Literature review

AI can surely streamline processes for learners by swiftly carrying out what is required, but stifles their creativity in one way or another. The potential to save time and effort for language learners with AI is vast; learners can easily talk to bots to practice their speaking skills, for example. However, overreliance on the data provided by AI-powered tools may cause problems for them, as the data might be biased, not convenient in terms of cultural dimension, and the way education helps learners critically assess the information provided by the tools (Broadhead, 2024; Broussard, 2023).

In addition to Facione's (2011) well-established model of critical thinking, Brookfield et al. (2019) offered an important perspective by emphasizing that critical thinking is not only a matter of mastering cognitive skills but also of questioning the ideologies and power structures internalized by individuals. According to Brookfield, critical thinking involves the ability to recognize, analyze, and challenge dominant ideologies rather than merely accepting them. He highlights that fostering critical thinking requires exposure to multiple perspectives, reflective questioning, and an awareness of social justice issues embedded in education. Brookfield also identifies the necessity of cultivating critical self-reflection through four lenses: students' perceptions, colleagues' feedback, theoretical perspectives, and personal experience. This broader understanding of critical thinking — linking it to power, ideology, and social change — is particularly relevant when considering how AI may influence thinking skills and autonomy in educational contexts. AI tools could either support critical reflection and democratize learning or, conversely, reinforce passive acceptance of algorithm-driven outputs unless users are equipped with robust critical capacities (Brookfield et al., 2019).

On the other hand, AI is defined as "the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable." (Boden, 2018, p. 2). According to the definition, the whole issue is about making machines intelligent, or in Nilsson's (2009) words, "endowing machines with intelligence" (p. 13). In other words, the term refers to the type of intelligence that is endowed to human beings but simulated by machines.

Hence, intelligent machines can perform work that humans do; however, what if the work is more sophisticated and complex? Tasks such as medical diagnosis, legal document analysis, autonomous driving in unpredictable environments, and creative content generation (like writing or composing music) exemplify the kinds of difficult activities increasingly undertaken by AI. The type of work done by the AI-powered machine or tool has the potential to make human beings exert less effort to carry out these complex tasks.

Regarding AI-powered technologies in education, particularly, it is believed that AI tools can change the tasks to be automated, through which the chance of thinking to solve problems, making decisions, evaluating and analyzing ideas, and defending arguments is null (Mohammmadkarimi & Qadir, 2025; Rudolph et al., 2025). Hence, no chance for some cognitive tasks by humans has been left since AI is doing it more efficiently. Poliakov (2024) stated that AI tools have begun to be introduced into education, and they are under consideration by many scholars, policy makers, teachers, program designers, etc. Popenici (2023) and Rudolph et al. (2025) suggested that education systems should rethink and redevelop their programs to be responsive to the new learning environment created by AI-powered technologies. Their suggestion indicates that AI-powered technologies will significantly influence the education sector, contingent upon data quality, learners' critical engagement with available data, and the necessity for a balance between AI utilization

and personal cognitive skills in the learning process.

A research study by Rusandi et al. (2023) explored the role of AI in academic research and education with a particular focus on advancing critical thinking skills and preserving intellectual honesty. According to the authors, AI is able to supplement learning and research processes when used honestly and correctly. They also believe that the integration of specific teaching methods in education and research can help develop better critical thinking skills. The article highlights the crucial need for fostering critical thinking abilities in students and researchers to navigate the realm of AI effectively, distinguishing reliable information from hoaxes and misinformation. It concludes that the partnership between AI and humans in education and research promises substantial advantages for both individuals and society, as long as there is a continued emphasis on honing critical thinking skills and upholding academic integrity.

Darwin et al. (2024) investigated the perceptions of master's degree EFL students regarding the impact (advantages and disadvantages) of AI in advancing critical thinking. For this study, qualitative research methodology was applied, where seven students came together from two Indonesian universities, mainly purposively sampled for the study. Data collection tools included case studies and semi-structured interviews. The results point to a subtly and distinctively construed view of critical thinking that involves questioning norms, contextual analysis, and evaluation of evidence. This led to the discovery that participants recognize the value of AI in facilitating various aspects of critical thinking, such as academic research or theoretical examination. However, the students evinced AI limitations regarding personalization issues, the potential for an electronic echo, and nuances in understanding it. The conclusion of the study is that AI can add to the development of critical thinking skills, but it requires careful management and a balanced approach to how to handle it while using it.

Jia and Tu (2024) carried out a study that examined the impact of AI capabilities on fostering critical thinking awareness among college students post-COVID-19. It highlighted the challenges that students faced during the pandemic, such as educational disruptions and increased stress, which could harm their critical thinking skills. The research used resource-based theory to view universities as entities with AI resources and investigated if AI can enhance students' critical thinking by boosting self-efficacy and motivation. Data from 637 students was analyzed using structural equation modeling, revealing that AI indirectly strengthens critical thinking through self-efficacy and motivation, but its direct effect is not significant. The study underscored the importance of self-efficacy in developing motivation and critical thinking, suggesting that while AI reshapes cognitive learning, its direct impact on thinking must be approached cautiously. The research contributes to understanding AI's role in education and its potential to develop critical thinking skills necessary for future growth.

Faqih (2023) also investigated college students' attitudes towards AI in developing literacy and critical thinking. The study used a mixed-methods approach with surveys and discussions among 60 students, analyzing their views before and after an AI learning activity. The findings show an increased recognition of AI's potential to enhance higher-level skills post-activity. Despite ongoing concerns about privacy, tech dependence, and ethics, students were more open to using AI responsibly. Their perceptions were influenced by their experiences with AI's development and application in education. The study suggests that with proper education on AI's responsible use and supportive policies, AI can significantly contribute to students' critical thinking skill development and empowerment.

Parsakia's (2023) article reviewed the complex effects of chatbots and AI on students' psychological and cognitive development in education. The study discussed the benefits of chatbots for academic support and personalized learning, as well as ethical concerns. The literature suggested that chatbots can boost self-efficacy and engagement, with mixed effects on self-esteem and self-confidence. While they may improve problem-solving skills and critical thinking, over-reliance could hinder the development of alternative strategies and real social interactions. The article emphasizes the need for future chatbot advancements to positively influence psychological well-being and cognitive growth, ensuring a balance between independent problem-solving abilities and critical thinking.

Essien et al. (2024), in their study, examined the impact of generative AI, particularly AI text generators like ChatGPT, on the critical thinking abilities of postgraduate business students in the UK. Employing Bloom's taxonomy for structure, the mixed-method research with 107 participants found notable improvements primarily at the taxonomy's lower levels. The study also raised concerns about the reliability, accuracy, and ethical use of AI in academia. The paper underscored the importance of a holistic approach to developing critical thinking and related skills in higher education, providing valuable insights for educators and policymakers on the nuanced effects of AI technologies in learning environments.

Though the role and impact of AI on critical thinking are highlighted by many studies, it still needs to be further researched. Nearly all the results of the reviewed studies highlight the positive impact of AI on critical thinking; however, concerns were raised that issues such as ethical considerations, the balance of use between AI and critical thinking, and the quality of the information provided by AI sources, among others, need to be handled carefully. The current study attempts to address the areas that have not been attended to before. Hence, the topic for the current study to address is, as its title implies, the impact of AI on human critical thinking and creativity. The effect can be both positive and negative; it can be on problem-solving, decision-making, understanding and analyzing ideas, creation and evaluation of arguments, etc. Sometimes, the biases in AI algorithms play a negative role in shaping critical things; thus, it is one of the goals of the current study to find the role and how to reduce it. Additionally, the study also attempts to identify how education influences individuals' ability to assess AI-powered information and how to maintain a balance between AI use and critical thinking.

Method

Research design

In order to comprehensively examine the very complicated and varied influence of artificial intelligence on critical thinking, it needed a capture method of measurable pattern and in-depth perspective. Here, the purpose is to understand a certain pattern across large student populations, but indeed some aspects such as individual reasoning processes, beliefs, and interactions with AI. Hence, it needs to be a mixed-methods design, which could accommodate the different approaches—from the quantitative breadth to the qualitative depth approach—in addressing the research question.

Participants

The study involved a diverse sample of 348 EFL students drawn from various educational backgrounds (undergraduate, master`s, and PhD) in different Iranian institutions. Participants were chosen based on age, educational level, and professional experience to ensure a representative sample. Convenience sampling was used to choose these participants according to their willingness and availability to participate in the study. Moreover, students' frequent use of AI was another criterion for choosing them. Information about the participants is illustrated in Table 1.

Table 1. Demographic information of students.

No	Female	Male	Age (average)	Undergraduate	Master	PhD
348	197	151	26	147	112	89

Data collection

The researchers developed a survey questionnaire to assess participants' experiences with artificial intelligence and its impact on critical thinking. The reliability of the questionnaire based on the Cronbach's alpha was about 0.91. Likert-scale questions were used to quantify responses, capturing the degree of influence AI has on decision-making and critical thinking. Additionally, demographic information and participants' educational backgrounds were collected. Moreover, semi-structured interviews were conducted with a subset of participants to delve deeper into their experiences and perceptions. Open-ended questions were used to explore intricacies in the relationship between AI use and critical thinking. Interviews were recorded, transcribed, and anonymized to ensure data accuracy and participant confidentiality. It should be mentioned that before collecting data, all participants signed the consent form.

Data analysis

Quantitative data were analyzed using descriptive statistics, including frequencies and percentages. Correlation analysis was employed to identify relationships between variables. Qualitative data underwent thematic analysis to extract patterns, themes, and insights from participants' narratives. The integration of both types of data provided a comprehensive understanding of the impact of AI on critical thinking skills.

Research questions

1. How does the use of artificial intelligence impact people's critical thinking skills in decision-making contexts?
2. What role do biases in AI algorithms play in shaping critical thinking, and how can we reduce these biases?
3. How does education influence individuals' ability to critically assess information generated by AI, and how can education help maintain a balance between AI use and critical thinking skills?

Results

Questionnaire

The results of the questionnaires are presented in the following sections. The first five questions present the impact of AI on critical thinking skills.

Items	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Impact of artificial intelligence on critical thinking skills					
1. AI-assisted decision-making enhances my ability to analyze information critically.	2%	11%	12%	34%	41%
2. Relying on AI for routine tasks has led to a decline in my independent critical thinking.	33%	39%	5%	9%	14%
3. Integrating AI in decision-making has improved the overall quality of my critical thinking.	2%	11%	12%	33%	42%
4. I feel less engaged in problem-solving when AI is involved in decision-making processes.	22%	51%	4%	16%	7%
5. AI's influence on decision-making has positively impacted my ability to make well-informed judgments.	15%	24%	2%	31%	28%

Only 13% of respondents agreed or strongly agreed that AI-assisted decision-making enhances their ability to analyze information critically, while a majority of 75% expressed some level of disagreement with this statement. A considerable 72% of respondents either agreed or strongly agreed that relying on AI for routine tasks has led to a decline in their independent critical thinking, indicating a widespread concern among participants. Similarly, only 13% of respondents agreed or strongly agreed that integrating AI in decision-making has improved the overall quality of their critical thinking, contrasting with 75% expressing some degree of disagreement. A significant 73% of respondents either agreed or strongly agreed that they feel less engaged in problem-solving when AI is involved in decision-making processes, highlighting a common sentiment among participants. While 39% of respondents either agreed or strongly agreed that AI's influence on decision-making has positively impacted their ability to make well-informed judgments, a substantial 59% expressed some level of disagreement with this statement.

Role of AI's biases in shaping critical thinking					
6. I am concerned about the potential biases in AI algorithms affecting critical thinking.	8%	28%	1%	37%	26%
7. Biases in AI algorithms hinder my trust in the decisions made by artificial intelligence.	35%	28%	3%	25%	9%
8. The presence of biases in AI algorithms challenges my ability to think critically about information presented.	55%	34%	1%	8%	2%
9. Awareness of AI biases has prompted me to critically evaluate information more thoroughly.	16%	32%	0%	37%	15%
10. Efforts to reduce biases in AI algorithms are essential for promoting unbiased critical thinking.	57%	39%	1%	3%	0%

In the second section of the questionnaire, 29% of respondents expressed concern about potential biases in AI algorithms affecting critical thinking, with a majority of 63% expressing some level of indifference or lack of concern regarding this issue. A notable 63% of respondents either agreed or strongly agreed that biases in AI algorithms hinder their trust in the decisions made by artificial intelligence, indicating widespread scepticism among participants. A significant 89% of respondents either agreed or strongly agreed that the presence of biases in AI algorithms challenges their ability to think critically about information presented, highlighting the substantial impact of biases on critical thinking processes. While 48% of respondents either agreed or strongly agreed that awareness of AI biases has prompted them to critically evaluate information more thoroughly, a considerable 52% expressed some level of disagreement with this statement, indicating a mixed response to the awareness of biases. An overwhelming 96% of respondents either agreed or strongly agreed that efforts to reduce biases in AI algorithms are essential for promoting unbiased, critical thinking, underscoring the widespread recognition of the importance of addressing biases in AI for fostering critical thinking.

Education and critical thinking					
11. Education has equipped me with the skills to critically assess information generated by AI.	4%	3%	0%	56%	37%
12. AI literacy should be a fundamental part of education to enhance critical thinking.	56%	44%	0%	0%	0%
13. Education has played a significant role in maintaining a balance between AI use and critical thinking skills.	0%	0%	1%	48%	51%
14. I feel confident in my ability to navigate the integration of AI while preserving critical thinking skills.	18%	24%	3%	33%	22%
15. Educational programs should focus on fostering a balance between AI utilization and the development of critical thinking skills.	49%	51%	0%	0%	0%

Only a small minority of 7% of respondents agreed or strongly agreed that education has equipped them with the skills to critically assess information generated by AI, while a substantial 93% expressed some level of disagreement with this statement. A significant 100% of respondents either agreed or strongly agreed that AI literacy should be a fundamental part of education to enhance critical thinking, indicating unanimous support for the integration of AI literacy into educational curricula. Interestingly, a substantial 99% of respondents either disagreed or strongly disagreed that education has played a significant role in maintaining a balance between AI use and critical thinking skills, suggesting a prevailing sentiment that education has not effectively addressed this balance. While 45% of respondents agreed or strongly agreed that they were confident in their ability to use AI while still being able to think critically, a significant 55% stated that they were not sure or did not feel confident in this area. All respondents (100%) either agreed or strongly agreed that educational programs should focus on finding a balance between using AI and learning how to think critically. It also indicates that everyone agreed on the significance of having this balance in educational settings.

Interview

Theme 1: AI's influence on critical thinking (enhancement vs. inhibition)

Across all academic levels—PhD, master's, and undergraduate—students recognized that AI can support decision-making and facilitate tasks, but they also expressed concern that excessive reliance on AI could hinder the development of independent thought. Students emphasized that while AI is a useful tool, it must be critically engaged with in order to preserve and activate higher-order thinking skills.

PhD Student 48:

"The way humans consider making decisions changes when artificial intelligence is introduced. The overreliance on AI can sometimes dull our instinctive sense of critical thinking. Decision-making will find a sharper edge if AI is combined with human thought."

Master's Student 92:

"Critical thinking influenced by artificial intelligence remains a critical subject. While AI provides beneficial information and makes things easier, it can also lead to some… bias and errors. To enhance critical thinking, one needs to develop the habit of verifying and questioning AI-generated information."

Undergraduate Student 13:

"While some problems can be solved with lightning speed through AI, human intervention still holds significance. This brings us to the real essence of developing our critical thinking skills: the constant need to engage with and challenge the information provided by an AI system while attempting to look at it from multiple perspectives."

This theme highlights the dual nature of AI: as a powerful facilitator of thinking and problem-solving, but also as a potential barrier to active cognitive engagement if not used reflectively.

Theme 2: Bias in AI and its impact on judgment

Participants noted that biases embedded in AI algorithms can shape the way information is received and interpreted, influencing user conclusions and undermining fair and balanced reasoning. These biases were seen as a significant threat to critical thinking and independent judgment, especially when AI outputs are taken at face value.

PhD Student 31:

"As previously mentioned, biases exhibited in AI algorithms modify information given to us, thus having far-reaching implications on critical thinking. These biases may allow us to make certain conclusions while completely overlooking others. Continuous auditing and evaluation of AI systems are put in place to lessen the imperfections and improve them."

Master's Student 85:

"In general, using information, artificially powered programs, and their biases affects the critical way we think. They can either amplify or lessen voices without intending to. Some methods repair and remove that problem."

Undergraduate Student 93:

"AI biases may support prejudices or ignore the views of minorities without realizing it. To get rid of bias, we need to focus on teaching moral AI and supporting openness in how algorithms make decisions."

In response, students proposed several solutions including more transparent AI systems, ethical programming, and continuous algorithmic inspections. These suggestions underscore the need for responsible AI development and awareness of its sociocultural impact.

Theme 3: The role of education in developing critical thinking

All students agreed that education plays a key role in equipping individuals with the tools to critically analyze AI-generated content. The level of depth and sophistication in understanding varied by academic level, with graduate students displaying a more nuanced approach.

PhD Student 12:

"University education allows students to critically analyze AI-generated content. Students are taught how to critique AI output for errors and bias. Education also helps students learn more about the ethics of AI and pushes them to keep learning so that they can find a balance between using AI and using critical thinking skills."

Master's Student 56:

"Education improves students' ability to think critically about information generated by AI by teaching basic skills in data analysis and interpretation. Students at the master's level learn how to tell the difference between useful and useless AI results."

Undergraduate Student 7:

"Education provides individuals the abilities they need to think critically about information generated by AI. Even though it's not much, students learn the basics of data analysis and logical reasoning through their coursework. This gives them important critical thinking skills."

The interviews show that education serves not only as a safeguard against uncritical AI adoption but also as a formative environment in which students learn to navigate complex, algorithm-driven information with discernment.

Discussion

Interpretive findings from the questionnaire and interviews indicate that Iranian university students are quite worried about the effect of AI on their critical thinking skills. Most participants were sceptical about AI-aided decision-making, as they believed that it would not improve their ability to critically analyze information. This illustrates what De Cremer and Kasparov (2021) were concerned about regarding the argument that although AI could perform sensitive cognitive tasks faster and more accurately than a human, it still lacks essential human qualities such as intuition or emotional understanding. This may encourage dependency on AI without activating critical cognitive skills. Such concerns align with Valenzuela's (2025) concern that excessive dependence on AI can inhibit the exercising of critical thinking skills because users get accustomed to delving into AI for decisions to be made.

A significant majority answered that dependency on AI for such target-setting tasks does not lend itself to independent critical thinking. This aligns with Poliakov's (2024) research, which highlights how AI tools often automate tasks that rely heavily on human analysis and reasoning, leading to cognitive engagement activities like task automation and AI replacement. These are also affected by what Spector and Ma (2019) say about how AI's ability to do critical thinking tasks can eventually make it harder for people to do more meaningful cognitive tasks, especially in educational settings where analytical skills should be taught.

Regarding this, a number of participants expressed a reluctance to engage in problem-solving when assisted by AI. According to Darwin et al. (2024), such students would say that the AI could help their academic research, but that it might end up making them echo chambers or robbing them of the fine-grained understanding of complex issues. Jia and Tu (2024) further mentioned that interaction with technology passively dampens one's intrinsic motivation to engage critically with problems. This, they say, is because it is indirect: there is an increase in motivation and self-efficacy, but the cognitive engagement aspect is minimal.

Some students acknowledged that seeing AI insights alongside their evaluation might help them maintain or even improve their critical thinking skills. This resonates with what De Cremer and Kasparov (2021) called "augmented intelligence," where AI is intended to supplement something that humans can do rather than take over entirely. Rusandi et al. (2023) agree with this point of view. They claim that AI is an important part of student education because it helps students think critically about and put external information from AI into context. This helps them make ethical decisions and think critically.

Critical issues involving the biases that need to be addressed in AI systems are also identified by the findings. Similar to Essien et al. (2024), who explain how AI generative models like ChatGPT may imbue biases and consequently cause biased or unbalanced decision-making, most of the participants agreed that biases in AI algorithms undermine their ability for critical thinking. This is supported by research by Valenzuela (2025), which cautions that AI's use of biased data can undermine the creation of autonomous, critical thinking. Some of them were much more careful about the content, while some argued that this consciousness was inadequate, an argument that fits well within Faqih's (2023) research call for explicit education on the moral application of AI since it might enable students to challenge AI outputs critically rather than be overly dependent on them.

Most of the participants agree that the minimization of AI biases is essential in promoting unbiased, critical thinking. This position is supported by the hypotheses of Poliakov (2024) toward greater justice and transparency in AI systems. Rusandi et al. (2023) call for research on AI bias elimination. They mention algorithmic transparency and the need for ethics-oriented AI training toward balanced and unbiased decision-making.

Continual monitoring of AI systems was also called for in the interviews. The students called for ethical AI education and showed how biases produce part of their information. This is consistent with Darwin et al. (2024), who would argue for a balanced approach toward integrating AI, thus maximizing its potential yet minimizing its disadvantages with regard to academic dishonesty and critical thinking.

The results also show that education falls greatly short of preparing students to assess information created by artificial intelligence. Many of the respondents surveyed by Poliakov (2024) thought that education had not properly trained them to weigh the uses of AI versus critical thinking. These writers assert that technological advancement runs ahead of school curricula, and thus, students are not prepared to deal with the intricacies pertinent to artificial intelligence. This educational gap is even more glaringly apparent when analyzed through the lens of Spector and Ma (2019), who argue for a radical change in educational priority toward the building of critical thinking capability in an AI world.

The general consensus for incorporating AI literacy into education for developing critical thinking skills has been corroborated by Rusandi et al. (2023) and Faqih (2023), who advocate for instructional activities that would instruct students to systematically evaluate AI-generated information. Such AI literacy would address Poliakov's (2024) call for "AI-ready education," merging technological literacy with ethics and critical thinking. Endorsing De Cremer and Kasparov's (2021) view that just as AI is created to complement human intelligence, so should there be an attempt to strike a balance between AI in schools and the development of critical thinking skills.

Thus, the study confirms the concerns about AI's counterproductive role, being both the enabler and inhibitor of critical thinking. Some past works, like Rusandi et al. (2023) and Essien et al. (2024), have highlighted various threats associated with overreliance on AI, such as impaired cognitive functions and reinforcing biases. The suggestions put forward by Poliakov (2024) and Faqih (2023)—on the need to equip students with at least the rudiments of assessment skills to counter AI's interference in learning—are also compatible with the call for making AI literacy an obligatory component of learning.

Conclusion

The topic of AI was instrumental in evaluating the critical faculties of interviewed participants from Iranian universities. It could be a harbinger of good changes being instigated by AI, while on the other hand, it could also be a deterrent to AI promoting autonomous critical thinking if much dependence and overuse are made upon it. The participants expressed their concerns over the risk posed by AI derived from algorithmic bias, over-reliance on automation, and potential loss of problem-solving skills. Further, the discussion clarified that the current systems of education were not sufficiently geared toward nurturing critical examinations of AI information/outputs. They did, however, concur on incorporating AI literacy into the curriculum so that the students are provided with what is necessary for them to critique AI outputs, recognize biases, and preserve intellectual autonomy.

As per the results, higher educational institutions need to immediately include well-structured modules on critical thinking with AI into their programs. They must also engage their faculties in training on how students can be guided on the use of AI tools, as well as help them in developing critical thinking skills concerning the limitations, ethics, and possible societal effects of such tools. With this, it can reposition higher education into a thoughtful human-AI collaboration rather than passive AI adoption.

The research has limitations, even with its contribution. The results might be less applicable to other academic and cultural settings as the sample population was made up of only Iranian university students. The reliance on self-reported data also increases the risk of bias and does not necessarily represent the actual behavior or ability of participants. The study also successfully disregarded the views of educators, policymakers, and AI developers in favor of giving priority to the views of students, which could have resulted in a more holistic picture of the issue.

Subsequent research needs to be conducted in various cultural and educational contexts to address these shortcomings. Longitudinal research also needs to be carried out to offer follow-up on the long-term effects of AI on critical thinking. An analysis of the perceptions of teachers and legislators would also yield valuable insights into the institutional steps needed to stem the dangers of AI. Moreover, certain interventions, such as AI literacy training, can be assessed in terms of their impact on the development of critical thinking skills by empirical research. For example, one outcome of enrolling in such programs is that through more process-based measures of students' learning - an understanding of how things are or not working - determining instructional styles will shed light

on how different indications of such instruction affect the cognitive engagement of students. Studying the ethical ramifications and designs for the inclusion and transparency of AI systems could nurture a more inclusive application of AI in education.

This creates both risk and potential where AI and critical thinking intermingle. On one hand, AI can assist people with decision-making; on the other hand, excessive reliance on AI breeds apathy of cognitive agency and challenges meaningful engagement. To address such dilemmas, stakeholders should work together to integrate AI literacy into existing curricula, make AI systems transparent and fair, and finance lifelong learning programs to bolster the development of autonomous reasoning skills alongside AI applications. Therefore, from this standpoint, if the balance is achievable, stakeholders can transform AI into an asset rather than an impediment, thus allowing people to navigate the digital age confidently.

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GenAI-powered tools for digitalising curricula: A critical AI literacy appraisal

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Abstract

The concept of digitalised curricula for the Fourth Industrial Revolution (4IR) is an exciting and evolving topic. Moving into the 4IR, the focus is on integrating advanced technologies like artificial intelligence (AI), machine learning (ML), robotics, and the Internet of Things (IoT) into higher education (HE) to create more personalised, efficient, and adaptive student learning experiences. 4IR has changed the pedagogical narratives from personalised learning to AI examinations in HE. This qualitative study explores the experiences of academics harnessing to digitalise curricula who participated in the online AI literacy training sessions on Generative AI (GenAI) tools at an open distance e-learning university (ODeL). Semi-structured online interviews were used to examine the views of participants. A purposive sampling of eight academics was interviewed on Microsoft Teams as a virtual platform. The transcribed data were uploaded and analysed using the computerised qualitative data software NVivo 14.0, and themes were identified. Findings reported that academics used GenAI-powered tools to create educational content for individual learning styles and paces for any course. Furthermore, virtual and augmented reality can create immersive learning environments for active student participation. Moreover, offering online learning options to accommodate diverse student needs was highlighted. To digitalise curricula, academics must be reskilled with AI literacy and other professional development sessions in critical thinking, problem-solving, and digital literacy to prepare students for future teaching professions. Participants facilitate collaboration through digital platforms (Moodle LMS), allowing students to work in team-based learning sessions. Finally, participants expressed concerns about the digital divide, data privacy, and ethics of using AI in digitalised curricula.

Introduction

Artificial intelligence (AI) has significantly transformed our lives, from using chatbots to socially connecting with family and friends to advancing online banking activities or online shopping (Ahmed et al., 2024; Popenici et al., 2023; Van Wyk, 2025). Moreover, AI has significantly changed the operations of businesses, governments, and the higher education sector (Ilieva, 2023; Khawaja et al., 2023). Since the release of various AI-powered tools, profound transformations have exponentially impacted operations in higher education. Therefore, given the latter, the Fourth Industrial Revolution (4IR) brought an exciting and evolving focus on integrating advanced technologies like AI, machine learning (ML), robotics, and the Internet of Things (IoT) into the higher education (HE) sector. Rudolph et al. (2025, p 14) debunked this myth by critiquing recent developments in AI-powered tools as 'disruptive game-changers', leading to significant advances and improvements in academia. However, higher education institutions (HEIs) have been in "crisis for decades, shaped by funding cuts, market-driven reforms and increasing corporatisation of universities", and AI-powered tools are "disruptive game-changers" in this crisis.

HE staff have an opportunity to integrate AI to create more personalised, efficient, and adaptive student learning experiences (Almatrafi et al., 2024; Alqahtani & Wafula, 2025). Given this opportunity, 4IR has changed the pedagogical narratives from personalised learning to AI proctoring examinations in HEIs, ensuring ethical and quality assurance issues are adhered to; integrating Generative Artificial Intelligence (GenAI) into the educational curriculum is a transformative shift in pedagogical approaches across multiple disciplines (Chan, 2023; Van Wyk, 2025). Since tech companies have published large language models (LLMs), it has become powerful tools for reshaping educational practices by enhancing personalised learning experiences (Popenici et al., 2023; Rudolph et al., 2025). Therefore, integrating GenAI into curricula challenges lecturers and students to be skilled in using GenAI-powered tools (Joseph et al., 2024; Sevnarayan & Maphoto, 2024). Furthermore, developing digital literacy competencies is essential for lecturers and students to navigate the complexities of GenAI integration in curricula.

The two game-changers, the COVID-19 pandemic and the launch of LLMs, such as ChatGPT and similar chatbots, have impacted academia significantly. Moreover, the most profound "game-changer" was the release of ChatGPT, which has shifted, reshaped, and disrupted how academics traditionally teach. This sentiment is supported by Kolade et al. (2024), who concur that

> ChatGPT is a disruptive game changer that further complicates and exacerbates the intractable challenge of essay milling, but also potentially offers new and promising pathways to learning and assessment (p. 2).

Given the latter, Rudolph et al. (2023) asked whether AI is a "personal digital assistant or job killer", and responded as follows:

> The developments in the generative AI space are progressing at a dizzying speed, teachers can benefit from using generative AI… if they know how to use generative AI in a critically informed way, substantial productivity gains are possible (p. 9).

Academics have praised the benefits of ChatGPT and similar AI conversational tools but also expressed concerns about ethical considerations, plagiarism, data privacy, and the protection of personal information. This prompted the management of XYZ University to take advantage of the benefits of GenAI-powered tools and implement awareness sessions on the ethical use of GenAI-powered tools. Studies reported that universities had planned continuous professional development (CPD) training sessions, organised webinars, online discussion sessions, and off-campus training to increase awareness of AI literacy and to train academics in AI-generated tools for teaching and learning (Limongi & Marcolin, 2024; Valenzuela, 2025). Based on these initiatives, some academics employed what they had learned during the CPD sessions, but others remain reluctant to integrate AI technologies into teaching spaces.

Before writing this paper, I was a college facilitator of in-house CPD training sessions on AI literacy for college academics. This movement accelerated all efforts by the college to empower academics with knowledge and skills in using GenAI-powered tools and machine learning. Over the past three years, the college has organised several AI webinars, module writing sessions, and ethics and AI literacy training to empower academics and students with AI-generated tools for online learning communities. Moreover, studies reported that critical AI literacy is the ability to understand, apply, and critically evaluate the purpose of AI technologies, focusing on their ethical, social, and practical implications to achieve learning objectives (Huang et al., 2024; Ng et al., 2021; Velander et al., 2024). Rudolph et al. (2025, p. 18) argue that AI-powered tools "increasingly influence academia… [but] educators and students require the skills to discern between authentic human insight and algorithmically generated output." In response to this urgent appeal, it is expected that academics who have gained AI literacy skills through the college's Digitalisation Project will utilise their newly acquired knowledge and skills in their respective courses. The assumption is that they were trained to integrate AI technologies into online learning community spaces. The latter resulted in an investigation of academics to determine if they applied what they had learned to integrate AI technologies in their respective courses. The primary objective is to explore academics' views on integrating GenAI-powered tools into digitalised curricula to enhance learning outcomes and engagement in online learning communities. Based on the aim, specific research questions are stated:

- What are the experiences and perceptions of academics regarding their AI literacy training with GenAI-powered tools for digitalising curricula?

- What are the concerns among academics regarding integrating GenAI-powered tools into digitalised curricula?

Context of the study

This study was conducted at the teacher education college, one of the ten colleges at an open distance e-learning university (ODeL). In 2019, the University of South Africa implemented the ten catalytic niche areas: Fourth Industrial Revolution (4IR) and Digitalisation; Student support and co-curricular activities; Marine Studies; Aviation and Aeronautical Studies; Health Studies and Medicine; Automotive; Energy, Space Study and Square Kilometre Array; Feminist, Womanist and Bosadi Theorisations. Another essential matter that impacted the university and the college was the National Artificial Intelligence (NAI) Policy Framework, which was also launched nationally to accelerate the implementation of AI policy and guidelines of HEs (Department of Communications and Digital Technologies, 2024). The teacher education college focused on (4IR) and digitalisation at the university where the research is conducted.

Since then, the college has organised several webinars, online discussion sessions, and off-campus training sessions to increase awareness of AI literacy and provide practical training sessions on applying AI-generated tools in the modules. The AI literacy sessions were held in the ten departments throughout the year. The catalytic niche areas and AI Policy Framework accelerated the implementation of GenAI-powered tools in the teacher education college. The college's online webinars were focused on awareness of the ethical use of AI-generated tools for online pedagogy. It emerged and has been approved by the AI policy and guidelines. As part of the ongoing awareness and application of GenAI-powered tools for teaching and learning, assessment and support, the college established a flagship project, the Digitalisation Project, which identified specific modules as part of the catalytic niche area.

Based on the university and college strategic objectives and operational plan (2023-2030), academics were trained to use and apply the gained AI literacy skills in their respective courses. The university had approved AI-generated tools such as Grammarly (writing assistance in paraphrasing), Turnitin (detecting plagiarism) and CoPilot (generated text/context) for digitalised curricula and online pedagogy. The college management mandated that the authors of this paper conduct oversight visits to verify whether academics applied what they learned about AI literacy, ethics, and tools in their online courses. Moreover, academics in the context of this study were exposed to and capacitated with AI literacy, tools and technological skills. The assumption is that they will successfully integrate AI technologies into online learning community spaces. The latter resulted in an investigation of academics using GenAI-powered tools for online learning and teaching.

Theorising an online learning community (OLC) space

Ke and Hoadley define an online learning community (OLC) as "a developed activity system in which a group of learners, unified by a common cause and empowered by a supportive virtual environment, engage in collaborative learning within an atmosphere of trust and commitment" (2009, p. 3).

Studies have reported that OLCs have become essential to modern educational frameworks, particularly in online and blended learning environments (He, 2022; Jin et al., 2010; Kear et al., 2014). The theoretical grounding of OLCs is rooted in various educational and psychological theories that emphasise the importance of social interaction, community building, and collaborative learning (Lambropoulos, 2007). In this case, this synthesis explores the characteristics of OLCs, their theoretical foundations, and their implications for educational practice at an ODel university.

The argument is that the core of OLCs is their participation in this study, which is related to active social online presence. Therefore, the degree to which participants (students and academics) feel socially and emotionally connected online is a component of a successful OLC. According to He (2022), social presence fosters engagement and interaction among online learners, enhancing their learning experiences. This aligns with the OLC, which posits that effective online learning occurs through the interplay of social, cognitive, and teaching presence (Chuang et al., 2016). The OLC framework underscores the necessity of creating a supportive community where learners can collaborate and engage meaningfully with course content and each other online.

Furthermore, the characteristics of OLCs are multifaceted. Jin et al. (2010) believe that thriving OLCs are characterised by a clear purpose, technological support, and established norms and policies. Concerning this single case, participants and lecturers facilitate a structured online environment (Moodle LMS) conducive to learning and collaboration. Furthermore, Chuang et al. (2016) emphasise that OLCs require participants to be socially and emotionally engaged to create a sense of community and cohesion, vital for successful collaborative learning activities. On the other hand, Kear et al. (2014) expressed concerns about low online presence but suggested that personal profiles can solve this concern. This will increase online engagement, often facilitated through various online tools and platforms, enabling community interaction, discussion, and resource sharing.

Another critical characteristic of OLCs is their adaptability to diverse learner needs and contexts, which is crucial. Research by Chinyamurindi et al. (2017) indicates that the usability of an online learning community significantly influences student engagement and interaction. This is particularly relevant in varied contexts, such as urban and rural settings, where learners may face unique challenges related to technology access, infrastructure, and learning styles. Therefore, the design and functionality of OLCs must be tailored to meet the specific needs of learners, particularly in varied contexts such as urban and rural settings (Lambropoulos, 2007). The

perceived effectiveness of an OLC is closely linked to its design, which should consider the unique challenges faced by different student populations.

Moreover, the role of peer support in OLCs cannot be overstated. Tang et al. advocate (2021) for strategies that encourage peer-to-peer interaction and teamwork, essential for building a collaborative learning environment. Such interactions enhance motivation and foster a sense of belonging among participants, which is crucial for their overall learning experience. Establishing a supportive community can increase engagement and improve learning outcomes as students feel more connected and invested in their educational journey.

The theoretical underpinnings of OLCs also draw from constructivist principles, which emphasise the importance of active participation and knowledge construction through social interaction. Wang et al. (2013) note that self-regulated learning strategies are essential for success in online environments, highlighting the need for learners to take an active role in their education. This aligns with the notion that OLCs provide a platform for collaborative knowledge construction, where learners can share insights, challenge each other's ideas, and co-create understanding.

In conclusion, OLCs emphasise social presence, collaborative engagement, and adaptability to learner needs. Grounded in theories such as the Community of Inquiry framework and constructivist principles, OLCs facilitate meaningful interactions that enhance the learning experience. As educational institutions continue to embrace online and blended learning models, understanding the dynamics and characteristics of OLCs will be crucial for designing effective learning environments that foster community, collaboration, and engagement.

Integrating GenAI-powered tools to digitalise curricula

Integrating GenAI-powered tools like CoPilot, Gemini, and ChatGPT into HEIs is rapidly transforming the educational landscape. This necessitates critically examining the implications for curriculum design, teaching methodologies, and student engagement.

According to Sauder (2024), GenAI can facilitate case-based learning for medical students by providing automated scoring, teaching assistance, and quick access to information, thereby streamlining the educational process. In addition, Cervantes et al. (2024)'s work underscores the growing recognition of GenAI's capacity to revolutionise pedagogical approaches and advance knowledge discovery in the medical field. This convergence of perspectives suggests a promising future for GenAI in healthcare education, with the potential to enhance learning experiences, personalise instruction, and accelerate research progress. Cervantes et al. (2024)'s work underscores the growing recognition of GenAI's capacity to revolutionise pedagogical approaches, particularly through its ability to generate case scenarios and create content tailored to individual learning needs (Cervantes et al., 2024).

Anderson (2024) highlights a critical challenge in integrating GenAI-powered tools into education. Academics often lack clear policies regarding GenAI tools, leading to concerns about model trustworthiness and ethical issues (Sevnarayan & Maphoto,2024). Barrett & Pack (2023) highlight a similar critical concern: the lack of clear academic policies and guidelines regarding the acceptable use of GenAI-powered tools. This ambiguity raises concerns about model trustworthiness, ethical implications, and student adherence to academic integrity standards. The need for structured frameworks that guide the ethical and effective use of GenAI in educational settings is essential to mitigate risks associated with over-reliance on these technologies (Anderson, 2024; Barrett & Pack, 2023).

Moreover, the generational gap between students and lecturers presents additional challenges. Chan (2023) highlights that Gen Z students are more inclined to adopt GenAI-powered tools than their Gen X and millennial academics, suggesting that academics must adapt their teaching strategies to engage these digital natives effectively. This generational divide necessitates reevaluating pedagogical approaches to ensure that curricula remain relevant and engaging for all students, regardless of technological proficiency (Barrett & Pack, 2023).

The role of lecturers in this evolving landscape is critical. Ravarini (2024) proposes a conceptual framework that positions academics as creators and designers in integrating GenAI, emphasising the importance of collaborative co-creation and adaptive design in curriculum development. This framework encourages academics to leverage GenAI as a facilitative agent, enhancing the learning experience while maintaining their role as guides in the educational process (Ravarini, 2024). By fostering an environment of collaboration between academics and GenAI, institutions can create more dynamic and responsive curricula that meet the diverse needs of students.

Melash et al. (2020) argue that digital competencies should be incorporated into CPD training programmes to prepare future academics for the demands of a digitalised educational landscape. This sentiment is supported by Siddiq (2018), who emphasises the need for national curricula to reflect the competencies required for 21st-century education, including digital literacy. By embedding digital literacy within curricula, educational institutions can ensure that students and lecturers can utilise GenAI-powered tools effectively and ethically.

In addition to digital literacy, the ethical implications of GenAI use in education warrant careful consideration. Vallis (2023) discusses the importance of collaborative sensemaking with GenAI, advocating for reflective practices that enhance academics' understanding of the technology's implications. This approach encourages academics to engage with GenAI critically, fostering a culture of ethical awareness and responsible use within educational settings (Vallis, 2023). As the education landscape evolves, lecturers must remain vigilant about the ethical dimensions of GenAI integration, ensuring that student welfare and academic integrity are upheld.

The potential for GenAI to enhance educational outcomes is further supported by the findings of Ilieva (2023), who explores the transformative potential of AI chatbots in blended learning environments. Moreover, integrating intelligent GenAI conversational tools can facilitate interactive learning experiences, allowing students to engage with course material innovatively (Ilieva, 2023). This aligns with the broader digitalisation trend in curricula, as highlighted by Delcker (2022), who notes the increasing emphasis on digital content across vocational education. Incorporating GenAI-powered tools into curricula can thus enhance the overall educational experience, promote engagement, and improve students' learning outcomes.

Despite the promising potential of GenAI, challenges remain in its implementation. Brown et al. (2020) highlight the disparity between students' digital literacy levels and their ability to apply these skills in clinical settings, indicating a need for curricula that bridge this gap. This finding underscores the importance of practical training and real-world applications of digital skills within educational programmes, ensuring that students are adequately prepared for the demands of their future careers (Brown et al., 2020; Delcker, 2022).

The rapid advancement of GenAI necessitates ongoing professional development for lecturers to integrate these technologies into their teaching practices effectively. The authors argue that academics need continuous training to stay abreast of the latest developments in GenAI and acquire the necessary skills to leverage these tools effectively. Furthermore, the professional development programmes should equip academics with the tools and strategies needed to navigate the complexities of GenAI, fostering a culture of innovation and adaptability within educational institutions (Walczak & Cellary, 2023).

In conclusion, digitalising curricula through integrating GenAI-powered tools presents opportunities and challenges for HEIs. By embracing the potential of GenAI to enhance personalised learning experiences, academics can create more dynamic and responsive curricula that meet the diverse needs of students. However, this integration must be accompanied by a commitment to ethical practices, digital literacy development, and ongoing professional development for academics. As the educational landscape continues to evolve, institutions must remain proactive in adapting their curricula to harness the transformative potential of GenAI while addressing the challenges accompanying its implementation.

Digital divide, data privacy and ethical issues of GenAI tools
Integrating AI technologies has become increasingly pervasive in the rapidly evolving HEIs, transforming how students learn and engage with course materials. As academic institutions strive to adapt to the demands of the 21st century, concerns surrounding the digital divide, data privacy, and the ethical implications of using GenAI in digitalised curricula have emerged as critical issues that warrant in-depth examination. (Anderson & Rivera-Vargas, 2020).
The digital divide highlights the disparities in access to technologies and the internet, which can significantly impact education equity (Gorski, 2005; Memon & Memon, 2025). Efforts to bridge this divide aim to ensure all students have equal access to digital resources like laptops and data for a digitalised curriculum (Afzal et al., 2023; Damarin, 2000). The increasing digitalisation of higher education institutions (HEIs), while offering expanded access to learning resources through digital learning spaces (Bygstad et al., 2022; Hamadi & El-Den, 2024), presents significant challenges. Concerns persist regarding exacerbating the digital divide, potentially further marginalising students with limited access to technology or digital literacy skills (Ahuja, 2023). This is particularly relevant in South Africa, where historical and socioeconomic disparities have contributed to a significant digital divide. Many South African students, particularly those from disadvantaged backgrounds or remote areas, may lack access to hardware, software, and reliable internet connectivity, limiting their ability to fully engage with the digital learning environment (Naidoo & Naranjee, 2023). Bridging this divide is a paramount challenge that must be addressed to ensure that all students, regardless of their socioeconomic status or geographical location, can benefit from the advancements in digital education.

Studies reported that data privacy and ethical concerns remain significant for HEIs when digitalising curricula (Ismail, 2025; Marshall et al., 2022; Vaza et al., 2024). Findings from these studies revealed that alongside the promise of digital transformation, there are growing concerns about the ethical implications of data collection and usage in digitalised curricula. The ubiquity of data breaches and the potential for misuse or unauthorised access to sensitive student information raise significant privacy concerns. HEIs must navigate a delicate balance between leveraging data for personalised learning and safeguarding the privacy rights of students (Van Wyk, 2024; Sevnarayan & Maphoto, 2024). Furthermore, using GenAI-powered tools in digitalised curricula in educational settings introduces additional ethical considerations (Akgun & Greenhow, 2022). Moreover, the dense nature of AI algorithms, often called the 'black box' problem, can lead to concerns about the transparency and accountability of these systems, potentially perpetuating unfair or harmful applications (Van Wyk, 2025).

Studies revealed that the ethical risks associated with GenAI-powered tools in HEIs have attracted the attention of governments, organisations, and academics worldwide, prompting in-depth reflections on the relationship between humans and technology (Akgun & Greenhow, 2022; Nguyen et al., 2023; Popenici, 2023). As GenAI-powered applications continue to permeate the educational landscape, policymakers, academics, and researchers must collaborate to develop robust ethical frameworks and regulatory guidelines to ensure that digital technology integration aligns with education's core values: accessibility, inclusivity, and the holistic development of learners.

Methodology

As part of the facilitation team of the college's Digitalisation Project, an invitation was sent to 104 academics trained in GenAI-powered tools and AI literacy. The sample consisted of eight academics who consented to participate in this

study. After receiving the signed consent applications, the date and time of the interview sessions were provided. Only the eight academics in the CPD training on AI literacy were selected. This qualitative approach used semi-structured online interviews to examine participants' views. Pseudonyms were used and coded to protect the identity of participants (males were Sam, Seth, Tebogo, Thabiso; females were Lisa, Sarah, June, Zandile). Before the interview sessions, participants were informed about their right to withdraw from the study if they felt uncomfortable at any stage of the project. The semi-structured interviews were conducted on Microsoft Teams as a virtual platform. The recordings and transcriptions were downloaded. The data presentation and analysis were designed in two stages. First, all the data sets (transcripts and recorded videos) were coded in the NVivo 14.0 system, uploaded into the computerised qualitative data software, and themes were identified. The data analysis used the NVivo 14.0 computerised qualitative software to create themes associated with the coded participants' extracts.

The following procedures were based on qualitative computerised software:

- The *project name* was created (digitalised curricula for online community);
- Uploaded *participants' codes* (gender, pseudonyms) and data sets of each case (extracts);
- Displayed preliminary results, made adjustments, and ran a *final version* of the qualitative software for generating themes;
- Downloaded *themes* linked to extracts, interpreting the results of participants' extracts; and
- Verified and compared the *original extracts of participants* linked to each theme for reporting.

Second, the verification was undertaken with participants who received the original transcripts (verbatim) and the themes generated by NVivo's qualitative computerised software. Each participant verified the original transcripts and compared them with the generated themes. After acceptance of the data sets, participants signed to validate the transcribed data and themes generated by NVivo (participant validation).

Findings

Findings reported that academics used GenAI-powered tools to create educational content for individual learning styles and paces for any course.

GenAI-powered tools are 'disruptive game-changers' that have reshaped the academic landscape

Participants were positive about how AI is reshaping the academic landscape. Furthermore, virtual and augmented reality can create immersive learning environments for active student participation.

> For sure, GenAI has emerged as a powerful tool, a game-changer to reshape our educational practices by enhancing personalised learning experiences for students. There is no turning back; AI is the norm and is here to stay. We need to adapt to it or become redundant (Sarah).

Some opine that academics must create awareness in their respective modules of how best and appropriately students can use the tools. According to the participants, some students are miles ahead and, therefore, create dialogue for the ethical use of AI tools.

> I agree! AI is not just a tool; it is reshaping the landscape of our subjects, and in my case, that is science. Instead of playing AI 'police,' I must empower my students to become AI-literate as science thinkers who understand and use AI responsibly (Seth).

Another participant said:

> Yes! The AI revolution is unfolding all around us, and it's happening fast. The real choice isn't whether to engage with it but how we engage with it (Thabiso).

Empowered with AI literacy to increase academic competence

Participants agreed that CPD training on AI literacy was valuable for their respective courses. The AI literacy skills acquired during the project helped participants design practical tasks and assessments, providing them with guidance and support. Some were positive about the training, which most of them preferred.

> Most of the sessions were informative and practical—they helped me apply what I had learned during the college training as a visible learner. The activities were appropriate for most of the six sessions (Sam).

Participants indicated that the sessions were well planned, the content was appropriate, and the sessions' facilitators and venues were excellent.

> I like how the training sessions were planned; they were very practical in my module. The venue was conducive. There are no internet connectivity issues. The two facilitators were excellent and knowledgeable about AI literacy, and most of the tools we were exposed to provided motivation for me to implement what I had learned and apply my modules (Lisa).

AI literacy created confidence in integrating GenAI to digitalise curricula

The participants expressed gratitude for CPD training, as it enhanced their confidence in experiencing the benefits of integrating GenAI-powered tools in their respective modules.

> I was sceptical about the benefits of GenAI-powered tools for online teaching. I am more confident about applying GenAI-powered tools in my online course. I spent more time planning and preparing for my online classes, but GenAI-powered tools like CoPilot have helped generate specific content for some of my learning units since the training (June).

Many felt that students had already used AI tools, and academics were lagging in using GenAI-powered tools for teaching and learning.

> The revolution is already here. Our students already use AI—some ethically, others without guidance, simply because their lecturers are not equipped to show the way. The choice is not whether to join the AI revolution but whether we will help shape it or watch from the sidelines (Tebogo).

AI has profoundly changed how traditional examinations become authentic assessments

Participants believed GenAI has profoundly changed how traditional examinations turn into authentic assessments. Moreover, offering online learning options to accommodate diverse student needs was highlighted. To digitalise curricula, academics must be reskilled with AI literacy and other professional development sessions in critical thinking, problem-solving, and digital literacy to prepare students for future teaching professions. Participants facilitate collaboration through digital platforms (Moodle LMS), allowing students to work in team-based learning sessions.

> After the AI literacy training, I had to rethink the type of assessment tasks, projects and future examinations for my courses. I changed all my previous tasks and decided to change the current type of examination to continuous assessment. I will complete the requirement changes in my tutorial letter 2026. My view is to move beyond traditional assessments and toward more authentic assessments. As said, AI literacy gave me the skills to change my assignments or project-based learning tasks (Zandile).

AI policy and providing guidelines for the ethical use of AI tools

Participants mentioned they were exposed to submitting inputs in the AI policy and guidelines. Over the past three years, staff and students were exposed to and aware of the module sites of AI policy and guidelines related to teaching and learning and academic integrity; now that we are exposed and empowered to use the AI policy and the guidelines, ignorance will not be tolerated in the university. This participant said:

> Staff and students were widely informed of the approved AI policy and guidelines. These guidelines provided clarity on what GenAI-powered tools are allowed… We can use Grammarly, Copilot, Turnitin, and the Invigilator app. There is no excuse for ignorance. Consequential management will be applied if staff and students breach AI policy protocols (Lisa).

Most importantly, participants agreed that GenAI can be used, but that there needs to be an inculcation of a sense of ethically responsible use of generated AI tools. Participants expressed concerns about the digital divide, data privacy, and ethics of using AI in digitalised curricula.

Participants opined that we were capacitated of the approval and use of AI tools ethically:

> For us, the ethical use of AI by students is a huge issue we must address. Students need guidance on how to use AI effectively and teach responsible usage—I informed my students about the ethical use of approved GenAI-powered tools (Sam).

On the other hand, this participant raised valid concerns about some of her students from rural communities and low socioeconomic status, which may impact accessibility and the lack of resources. Zandile echoed concerns:

> My concerns are about the digital divide, data privacy, and the ethical implications of using GenAI in writing assignments and digitalising the content in my course. Students exploited these AI tools, and some cheated in assignments (Zandile).

Importance of creating awareness and empowering students to use AI-generated tools

Since ChatGPT was launched, many other GenAI-powered tools have flooded the public domain. These GenAI-powered tools are here to stay, and even better ones will emerge. Participants mentioned that these tools can generate subject content, detect plagiarism, design presentations, and support students' paraphrasing work. Participants felt they only had control of those GenAI-powered tools (Grammarly, CoPilot and Turnitin) approved by the university as stipulated in the AI policy and guidelines. If those GenAI-powered tools are allowed, they will be responsible for creating awareness and empowering students with AI literacy in their respective modules or subjects.

> You cannot stop your students; they are using it. Whether you like it or not. I empowered and encouraged my students and colleagues to harness the possibilities of these tools. Used the generated content to enhance critical thinking (evaluate/assess) about the generated text/content for relevance for context, reflective thinking (reimaging/rethink), and problem-solving skills (June).

Some participants said they still need more training in these AI tools. They indicated that follow-up sessions to revitalise and refresh how some GenAI-powered tools operate can further strengthen their knowledge and skills.

> The "cat and mouse" approach to AI detection is obsolete. As lecturers, we face a pivotal moment that demands a fundamental mindset shift (Sarah).

Concerns about the digital divide and the ethics of AI

Some participants expressed concerns about the lack of access to technologies:

> For my students, the "digital divide" is about the gap between students with access to modern technologies. By the way, those without…could not access my module content and information; they became students-at-risk (Sam).

One participant's research focuses on social justice and the digital divide. According to the participant, a lack of online presence is related to poor internet connectivity issues. This had an impact on his rural students. Located in rural areas, students could sometimes not be online because of missing learning opportunities.

> In 2024, we experienced several challenges with electricity issues by Eskom (South African Electricity Supply Commission), which impacted my students in rural areas. Often, there is a lack of access to high-speed internet compared to urban areas (Sarah).

A concern raised by participants was that students are using AI tools unethically. A participant was extremely worried about the unethical practices used by students to risk the credibility of assessments:

> Recently, I read a newspaper article in University World News that stated that about 92% of university students use AI to write assignments and examinations. We face a silent threat to our assessments and qualifications because AI-powered tools spread like wildfire, and traditional anti-cheating methods fail to keep up (Tebogo).

Protection of private information (data privacy) when using AI tools

During the interviews, participants agreed that data privacy is vital to protect our information. In 2013, the South African government introduced the Protection of Personal Information Act (POPIA Act 4 of 2013) to protect our personal information from unauthorised persons. Hence, the university had to comply with this act and update its policy and guidelines.

> Yes, we had the POPIA Act to protect data privacy… but still, you received "fake emails", unidentified calls, and "spam" daily.. on your mobile phone or emails. I am worried that university officials used your information for personal gain or leaked information to unauthorised people (Seth).

GenAI-powered tools generated data that is biased and shows stereotyping.

For most participants, the ethics of using GenAI-powered tools constitutes a significant challenge, as do issues related to moral implications and potential risks associated with AI tools. Other issues participants highlighted were the biases of AI tools, which could portray discrimination, sensitive information and stereotyping information generated by AI tools.

> There are always moral and ethical issues when using AI tools. I read an article on the biases of AI tools. This opened my mind about stereotyping and misinformation (Sam).

Discussion

The findings of this study revealed that the experiences and perceptions of academics regarding their training with the integration of GenAI-powered tools for digitalising curricula were very positive. The CPD training empowered them with AI literacy knowledge and skills to increase academic competence in using GenAI-powered tools in the course. Academics could apply AI literacy knowledge and skills to increase their modules' social presence in OLCs. Therefore, the degree to which students and academics engage socially and emotionally as connected in online discussion forums is a component of a successful OLC (He, 2022). The digital transformation of HEIs has given rise to "digital learning spaces" where students can access educational resources virtually anywhere (Bygstad et al., 2022; Hamadi & El-Den, 2024).

The participants felt empowered that AI literacy was vital, which created confidence in integrating GenAI-powered tools to digitalise curricula to achieve learning outcomes and engagement in online learning communities. The ability of GenAI to generate case scenarios and create content tailored to individual learning needs can significantly enhance the learning experience, allowing academics to focus on more complex instructional tasks (Sauder, 2024; Cervantes et al., 2024). Participants said the CPD training created a paradigm shift and reshaped the academic landscape. Moreover, the generational gap between students and lecturers presents additional challenges. However, the successful training sessions related to AI literacy and tools empowered participants to guide and support students who are more inclined to adopt GenAI-powered tools and pedagogical innovative strategies to engage this digital-native population effectively (Barrett & Pack, 2023; Chan, 2023).

The findings of this study concurred with the role (participants) academics should play and that CPD initiatives to empower them were important for successfully integrating GenAI-powered tools in redesigning the content for their modules. Ravarini (2024) proposes a conceptual framework that positions lecturers as creators and designers in integrating GenAI, emphasising the importance of collaborative co-creation and adaptive design in curriculum development. As part of the CPD for this study, it argues that digital competencies should be incorporated into teacher training programs to prepare future academics for the demands of a digitalised educational landscape (Melash et al., 2020; Siddiq, 2018). It is argued that the digitalised curricula should be revised to reflect the competencies required for a 21st-century education, including AI and digital literacy skills. Participants mentioned that digital literacy became vital for student teachers in some learning units. However, the ethical implications of GenAI use in modules require careful consideration when implementing digital literacy. This approach encourages lecturers to engage with GenAI critically, fostering a culture of ethical awareness and responsible use within educational settings (Vallis, 2023). As the education landscape evolves, lecturers must remain vigilant about the ethical dimensions of GenAI integration, ensuring that student welfare and academic integrity are upheld.

Finally, participants raised concerns about the digital divide, data privacy, and discrimination regarding integrating AI into digitalised curricula. As academic institutions strive to adapt to the demands of the 21st century, concerns surrounding the digital divide, data privacy, and the ethical implications of using GenAI in digitalised curricula have emerged as critical issues that warrant in-depth examination (Anderson & Rivera-Vargas, 2020). Furthermore, one social justice issue, the digital divide, emerged during this rapidly changing environment, highlighting disparities in the socioeconomic student profiles to access AI technologies and the internet, which can significantly impact education equity (Gorski, 2005; Memon & Memon, 2025). Studies reported that more efforts are needed to bridge this divide and ensure all students have equal access to digital resources like laptops and data for a digitalised curriculum (Afzal et al., 2023; Damarin, 2000). However, this increased accessibility is not without its challenges, as the digital divide continues to be a significant barrier to equitable education (Ahuja, 2023). Many South African students, particularly those from disadvantaged backgrounds or remote areas, may lack access to hardware, software (tools of trade), and reliable internet connectivity, limiting their ability to fully engage (online presence) with the digital learning environment (Naidoo & Naranjee, 2023).

Implications

From a human capacity-building perspective, participants were empowered in AI literacy to develop curricula in their courses. They integrated GenAI-powered tools into their coursework, which led to confidence and motivation. Most participants embraced GenAI's potential to enhance personalised learning experiences. Therefore, they experienced the potential of GenAI-powered tools to create more dynamic and responsive curricula that meet the diverse needs of students. However, as many raised concerns about GenAI, this integration must be accompanied by a commitment to ethical practices, digital literacy development, and academic professional development. Practically, participants agreed that the training, webinars, and online discussion forums had empowered them with AI literacy skills. However, Rudolph et al. (2025, p. 18) justified that "critical AI literacy must be at the forefront of higher education curricula as digital technologies reshaped not only how knowledge is created and disseminated but also how it is critically appraised". As the higher education landscape continues to evolve, universities must remain proactive in adapting and digitalising curricula to harness the transformative potential of GenAI while addressing the challenges accompanying its implementation.

From a policy perspective, integrating GenAI-powered tools into digitalised curricula in HEIs would have numerous social, practical, and ethical consequences that must then be carefully regarded and addressed in AI policy and guidelines. Students or academics are not guaranteed to adhere to AI policy or guidelines. Socially, AI can either bridge or exacerbate existing educational inequalities, digital divide, and stereotyping, depending on how it is implemented. It is feasible that AI can enhance operational efficiency and personalise learning, but it requires significant investment in infrastructure, training, and integration.

In this study, the example of CPD training is only one aspect of empowering staff practically in using AI literacy. However, other initiatives can be employed to enhance AI literacy and digital proficiency in HEIs. Consequently, AI must be deployed with a commitment to fairness, transparency, and data privacy, ensuring that students' rights are protected and that AI systems are used responsibly. HEIs must navigate these complex challenges to ensure that AI enhances rather than undermines the objectives of higher education, paving the way for a more equitable, efficient, and ethically sound future.

Conclusion

This paper has argued that the experiences and perceptions of academics regarding their AI literacy skills training to integrate GenAI-powered tools as game-changers" for digitalising curricula were very positive and successful. The study found that the CPD training empowered participants with AI literacy knowledge and skills to increase academic competence by effectively using GenAI-powered tools in the course. The CPD training integrated GenAI-powered tools to empower academics to write effective prompts to create meaningful, personalised learning content for specific learning units. A second significant finding was that participants felt empowered in AI literacy, which is vital, and this created confidence in integrating GenAI to digitalise curricula to achieve learning outcomes and engagement in online learning communities. The participant's ability to use GenAI-powered tools to generate case scenarios and create content tailored to individual learning needs significantly enhanced their learning experience during the practical sessions. However, participants raised concerns about

the digital divide, data privacy, ethics and discrimination regarding integrating AI into digitalised curricula.

The current qualitative study only examined a small convenience sample of academics who participated in the CPD training on AI literacy to digitise curricula. This limitation needs further investigation by a larger sample of academics regarding the benefits and challenges of integrating GenAI-powered tools in teaching and learning. It would be interesting to assess the concerns raised by the participants in a larger sample of those who received CPD training in AI literacy. Therefore, undergraduate students must be included in similar studies about the awareness and use of GenAI-powered tools in teaching and learning.

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Navigating ethical challenges in generative AI-enhanced research: The ETHICAL framework for responsible generative AI use

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Abstract

The rapid adoption of generative artificial intelligence (GenAI) in research presents both opportunities and ethical challenges that should be carefully navigated. Although GenAI tools can enhance research efficiency by automating tasks such as literature reviews and data analysis, their use raises concerns about aspects including data accuracy, privacy, bias, and research integrity. This paper proposes the ETHICAL framework, which is a practical guide for responsible GenAI use in research. Employing a multi-stage single case study design, we examine multiple GenAI tools in real research contexts to develop the ETHICAL framework, which consists of seven key principles: *Examine policies and guidelines, Think about social impacts, Harness understanding of the technology, Indicate use, Critically engage with outputs, Access secure versions, and Look at*

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user agreements. Applying these principles will enable researchers to uphold research integrity while leveraging the benefits of GenAI. The framework addresses a critical gap between awareness of ethical issues and practical action steps, providing researchers with concrete guidance for ethical GenAI integration. This work has implications for research practice, institutional policy development, and the broader academic community as researchers adapt to an AI-enhanced research landscape. The ETHICAL framework can also serve as a foundation for developing AI literacy in academia and promoting responsible GenAI adoption in research settings.

Introduction

The term Artificial Intelligence (AI) has been in existence for at least 60 years (Cordeschi, 2007). Since the recent emergence of generative AI (GenAI) tools, such as ChatGPT, there has been an increased focus on AI within academia and the mainstream media. GenAI uses machine learning, incorporating large amounts of training data, algorithms and models to create text, images, code and audio (Bandi et al., 2023). Given the potential of GenAI to perform tasks currently only undertaken by humans, the implications for various professions and industries, including research, are significant. GenAI's influence is transforming traditional research methodologies, inviting both enthusiasm and scrutiny regarding its role in academic integrity and the quality of scholarly work. This dual impact underscores the need for clear ethical guidelines and new training protocols to integrate GenAI effectively in research settings.

In recent years, numerous GenAI tools have been developed, offering great potential to enhance various aspects of the research process. These tools have shown promise across multiple areas, including research idea generation (Dowling & Lucey, 2023; Pretorius, 2023; Pretorius et al., 2025; Xu et al., 2023), survey and questionnaire design (Götz et al., 2024), and literature search (Alqahtani et al., 2023; Extance, 2018). GenAI also aids in data generation (Pretorius & Cahusac de Caux, 2025), annotation (Matter et al., 2024), and augmentation (Kim & Lee, 2024), providing researchers with advanced tools to improve data quality and relevance. Additionally, GenAI models enable the simulation of human behaviour (Argyle et al., 2023; Aher et al., 2023), which can be beneficial in social science research. They can also be used to assist with complex data analysis tasks (Alqahtani et al., 2023; Christou, 2023; Pretorius & Cahusac de Caux, 2025; Pretorius & Pretorius, 2025; Sabbaghan, 2024). Moreover, these technologies have applications in academic writing (Lucey & Dowling, 2023; Lund et al., 2023; Mojadeddi & Rosenberg, 2023; Orenstein, 2023; Pretorius et al., 2025), science communication (Alvarez et al., 2024), peer review and publishing (Razack et al., 2021), and even research funding processes (Spyroglou et al., 2022).

GenAI's potential to revolutionise research practices lies in its capacity to automate traditionally time-consuming tasks, such as conducting literature reviews, cleaning datasets, and performing preliminary analyses. This automation can increase research efficiency and contribute to the quality of research outcomes, potentially improving the overall output and well-being of researchers (Bail, 2024; Sawyer & Henriksen, 2024). Furthermore, by facilitating real-time translation and interpretation, GenAI can bridge linguistic and cultural gaps, fostering more inclusive collaboration across international borders (Baldassarre et al., 2023; Pretorius et al., 2025). Through these diverse applications, GenAI stands poised to reshape the research landscape, offering tools that not only support existing research practices but also open new possibilities for innovation and cross-cultural exchange.

Although GenAI-assisted research tools have great potential to aid the research endeavour, many challenges have been identified with their use. These have mainly been experienced in relation to research integrity and social impact. In terms of research integrity, the use of GenAI tools raises several concerns, particularly regarding data accuracy, security, reliability, and authorship attribution. For example, the nature of GenAI means that its use may jeopardise a researcher's ability to meet privacy expectations required for ethics clearance or to protect commercially confidential information. Another major issue is the propensity for these tools to produce factually incorrect content, known as hallucinations (Mahyoob et al., 2023; Manakul et al., 2023), which means that the data and text produced can be factually incorrect or lacking in nuance. Transparency is also a major concern (Dwivedi et al., 2023), as information regarding how the GenAI tool was trained is often not available. This is referred to as the black box nature of AI (Barr, 2023; Bearman & Ajjawi, 2023) and makes it difficult for researchers to ascertain the reliability and recency of the data used to produce outputs, with consequences for the replicability of results.

As GenAI tools construct new material from training data based on existing works, ethical concerns have been raised regarding authorship, copyright and plagiarism (Frye & ChatGPT, 2023; Lund et al., 2023). For instance, tools such as ChatGPT may incorrectly reference the text it created (Lund et al., 2023; Walters & Wilder, 2023), making it difficult to acknowledge other authors' work accurately. Additionally, many AI models may have been trained on copyrighted works, often without permission (see, e.g., Creamer, 2023; Franceschelli & Musolesi, 2022; Hao, 2025; Rudolph et al., 2025). Despite recent court judgements in the United States of America noting that using copyrighted material for GenAI training falls under "fair use" policy due to its transformative nature (see, e.g., Jones Day, 2025), concerns remain as to whether legal disputes could arise (see, e.g., Dornis & Stober, 2025; Junhong & Bozkurt, 2025).

It is also important to consider the social impact of GenAI use in research. This mainly involves the perpetuation of bias, equity considerations, and environmental impact. Generative AI outputs are prone to bias, reflecting the political (Hartmann et al., 2023), racial (Zhang et al., 2023), disability (Hutchinson et al., 2020), and gender prejudices (Basta et al., 2019) contained in the large datasets on which they have been trained. Equitable access is another issue in this space. Much of the debate is situated within wealthy, developed economies where a large proportion of the population has access to GenAI. This is not necessarily true globally and may, therefore, reinforce the disadvantage of researchers working in less privileged contexts. There is also a growing concern regarding the environmental costs associated with GenAI (see, e.g., Bender et al., 2021; Luccioni et al., 2024), as well as questionable work practices by dominant GenAI firms (see, e.g., Tan & Cabato, 2023).

Compounding each of the issues outlined above is the pace of change in AI technologies. GenAI tools are emerging, undergoing further development, and being rapidly adopted by users, making it challenging for stakeholders to keep pace and adapt accordingly (Boyd & Wilson, 2017; Mingsakul, 2023). Developing AI literacy has, therefore, become essential to maximise GenAI's benefits and mitigate its challenges (see, e.g., Chugh et al., 2025).

To address this issue, this article presents the ETHICAL framework for GenAI use. Much of the current literature discusses the challenges of ethical GenAI-enhanced research; however, there is limited guidance on the appropriate actions that researchers should take to address these challenges. Therefore, the focus of this study is not only on identifying ethical issues, but also on what researchers can practically do to navigate the GenAI-enhanced research space ethically. In discussing the considerations for researchers and what they should do, this study also informs regulators, research institutions and GenAI developers so that they can better support and guide researchers and develop GenAI-enhanced research tools in ways that limit risk and maximise benefits.

Methodology

This paper synthesises personal experiences with a critical examination of literature on generative AI, offering a conceptual analysis of its ethical implications and responsible use. We adopted a constructivist paradigm, underpinned by an individual relativist ontology and a socially co-constructed epistemology (see Lincoln & Guba, 2016; Pretorius, 2024). Our study was designed as a single case study investigating the following research question:

> "What practical knowledge and guidance would assist researchers in effectively navigating the ethical challenges in generative AI-enhanced research?".

Yin (2018) highlights that the strength of a case study lies in its bounded, in-depth examination of a case within its context. We adopted a single case study design because it enabled us to conduct an in-depth examination of GenAI tools in practice. Case studies also require a clearly defined boundary (Yin, 2018). In our project, the case study focuses on the first author (DE) and his experiences using multiple GenAI tools to support his research practice. Our study was conducted in three phases: individual experimentation, refinement with a critical friend, and interdisciplinary collaboration with experts in the field.

In the first phase, DE experientially explored multiple GenAI tools, utilising them to support key research activities, including project conceptualisation, literature review and analysis, and grant writing, within the context of an actual research project. Case studies require the generation of data from multiple sources to gain an in-depth understanding of the topic under investigation (Yin, 2018). In our case study, DE systematically documented his experiences of using different GenAI tools, comparing and critically evaluating the outputs. Additionally, we incorporated reflective journaling as a data generation strategy. Reflective journaling is a valuable practice, as it enables researchers to critically engage with their own assumptions, positionality, and decision-making processes throughout a study (see, e.g., Ortlipp, 2008). By maintaining a regular record of thoughts, observations, and emotional responses, researchers can trace the evolution of their ideas, recognise potential biases, and make transparent the reasoning behind methodological choices (Ortlipp, 2008). In this study, DE maintained a reflective research journal to capture real-time insights, unexpected challenges, and emergent patterns in AI-supported research practices. The data generated during this initial phase were analysed using a reflexive thematic analysis approach (Braun & Clarke, 2006, 2019, 2022). This involved reading and re-reading the text, inductive coding to highlight key points, and constructing initial codes using the researcher's reflexivity as a lens (Braun & Clarke, 2022). Through this coding process, DE's explorations identified seven challenges of GenAI use in research: the quality of the output, data protection, copyright and intellectual property, lack of transparency, social impacts, disparities in access, bias propagation, and job displacement.

In the second phase, DE worked with the second author (LP) as a critical friend. A critical friend is typically a trusted peer or colleague who offers constructive critique, probes assumptions, and encourages deeper reflection (Costa & Kallick, 1993). Importantly, a critical friend occupies a collegial space that balances support with challenge, helping to articulate and examine a project through diverse perspectives (Costa & Kallick, 1993). LP helped DE refine the themes so that they presented distinct ideas. For example, disparities in access, bias propagation, and job displacement all reflected elements of a broader theme: social impacts. Through this process, seven initial themes were constructed and named to align with the acronym ETHICAL. These initial themes were shared at several conferences and workshops via an institutional research repository (see Eacersall, 2024), and feedback was gathered to further inform the process.

In the final phase, the themes were shared with a group of interdisciplinary educators and researchers working in AI research and practice (IS, ES, SI, RC, SS, DS-M, JS, IJ, RR, RK, AD, CLT, and KAH) to construct a robust framework for practice. All authors conducted a literature search, drawing on both academic sources and grey literature, given the rapidly evolving nature of the field. This collaborative effort allowed them to synthesise DE's personal experience data with existing research findings, ultimately developing detailed descriptions and actionable steps for each of the seven themes. These steps were also shared as a publicly available infographic (see Eacersall et al., 2025).

Previous research has shown that collaboration across disciplinary boundaries fosters creativity, shared meaning-making, and the integration of diverse perspectives (Bond et al., 2023). This is especially true when these interdisciplinary collaborations are grounded in reflexivity and a sense of shared ownership (see, e.g., Bond et al., 2023). In our study, collaboration was fostered through an intentional commitment to collective ownership and mutual respect, utilising collaborative writing and commenting in Google Docs. This enabled open dialogue, critical reflection, and the co-construction of ideas across disciplinary perspectives. Importantly, by integrating researcher reflexivity, peer engagement, and interdisciplinary collaboration, we established trustworthiness through methodological rigour, transparency, and consensus-building among co-researchers. The reflexive approach ensured that the constructed themes were rigorously analysed and grounded in lived academic experiences, making the findings both theoretically robust and practically relevant.

Findings and discussion

The seven themes we identified through the methodological process described above were: *E - Examine policies and guidelines, T - Think about the social impacts, H – Harness understanding of the technology, I - Indicate use, C - Critically engage with outputs, A - Access secure versions, and L - Look at user agreements.* These seven themes were combined to create the ETHICAL framework for responsible generative AI use (see Figure 1).

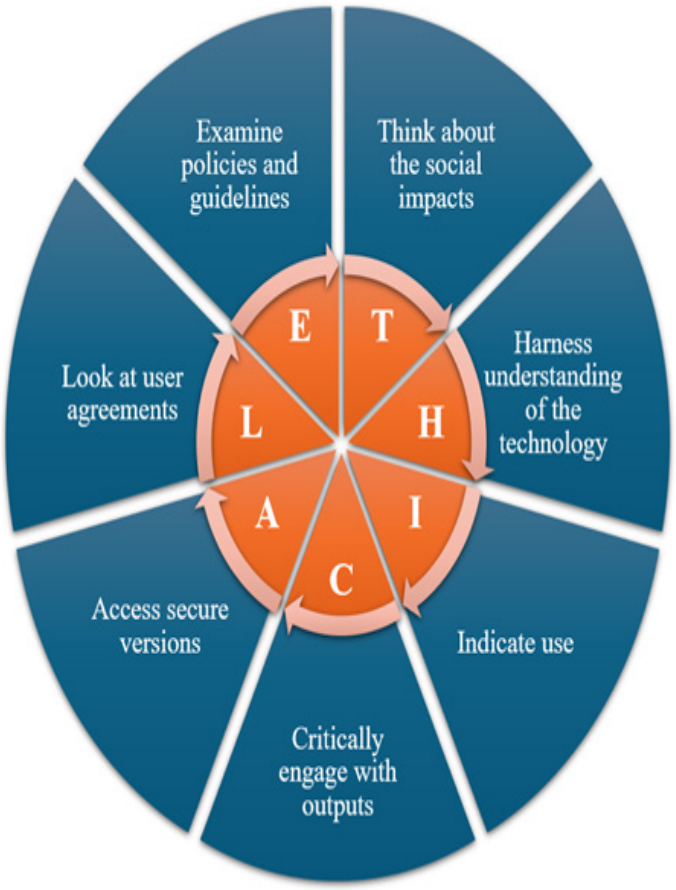

Figure 1. The ETHICAL Framework for Responsible Generative AI Use.

Our ETHICAL framework illustrates that the application of these ethical principles is not a one-time action but rather an ongoing, reflective process. This is emphasised using circular arrows, which symbolise the continuous, cyclical nature of ethical decision-making. As individuals engage with these principles, they are encouraged to revisit and reassess their actions, considering new information, evolving contexts, and shifting perspectives. Each component of the framework is discussed in detail in the following sections.

We acknowledge that we are not the first to use an acronym to explain the ethical considerations in GenAI use (see, e.g., Al-Ali et al., 2024), nor are we the first to align them with the term ethical (see Luckin et al., 2024). However, Luckin et al.'s (2024) EThICAL framework is designed for organisations to leverage the potential of GenAI by fostering AI readiness, while Al-Ali et al.'s (2024) LAIK framework is designed for classroom contexts. In contrast, our ETHICAL framework is designed specifically for research contexts.

E - Examine policies and guidelines

When examining policies and guidelines for GenAI, it is crucial to carefully review those relevant to the researcher's specific context, starting with broad international regulations, such as the European Commission's Living guidelines on the responsible use of generative AI in research and then narrowing down to specific national and local standards to ensure compliant and ethical use. These international frameworks guide the development, deployment, and use of AI technologies, focusing on trust, safety, and ethical standards (see European Commission, 2024; Novelli et al., 2024). They establish benchmarks that influence global practices and ensure compliance across borders. In addition to government regulations, ethical AI frameworks developed by non-governmental bodies, such as UNESCO's AI ethics recommendations (UNESCO, 2023), also play a critical role in shaping global standards for the responsible use of AI. These non-state actors provide additional guidance that complements formal legislation.

At the national level, it is important to consider country-specific regulations that may adapt or expand international guidelines to address local legal and ethical issues. Different nations may have unique requirements reflecting their legal environments and societal values. For instance, Australia's Tertiary Education Quality and Standards Agency (TEQSA) provides guidelines for the responsible use of AI in research in Australia (TEQSA, 2024). Additionally, Australia's policy for the responsible use of AI in government aims to ensure that AI is adopted with confidence and ethical integrity, enhancing public trust through transparency, governance, and an approach that aligns with community expectations in Australia (Australian Government, 2024).

Locally, policies may further tailor these broader guidelines to address regional practices and institutional norms. For researchers, this means understanding how local data protection laws and intellectual property regulations apply to their use of GenAI tools, ensuring compliance with national and international standards. Additionally, individuals, including researchers, must be aware of intellectual property rights related to content generated by GenAI to avoid potential legal disputes and respect creative rights (Smits & Borghius, 2022). Sector-specific policies may also influence how GenAI is regulated and applied across various industries, including healthcare, finance, and higher education. Organisations in these sectors may need to adapt their use of GenAI based on specific ethical or operational concerns. Becoming acquainted with sector-specific and internal organisational policies will enable researchers to align their GenAI practices more effectively with the expectations and demands of their workplace setting (Dwivedi et al., 2021).

Integrating international best practices with national and local regulations enables organisations, including research institutions, to develop robust, context-specific policies that address data privacy, transparency, accountability, and intellectual property issues (Lescrauwaet et al., 2022). Implementing this approach ensures that AI systems are legally compliant and ethically sound within their jurisdictions. Additionally, organisations must provide training and

resources to their staff to foster an understanding of these layered regulatory requirements (Kutty et al., 2024).

T - Think about the social impacts

The integration of GenAI into research necessitates a critical examination of its broader societal ramifications. These include considerations such as bias, equity, and environmental sustainability. While GenAI systems offer powerful capabilities, their reliance on extensive datasets can perpetuate existing biases, potentially leading to discriminatory outcomes (Ferrara, 2023; Junhong & Bozkurt, 2025). These biases can manifest in the reinforcement of harmful stereotypes and introduce unfairness into decision-making processes within critical domains such as healthcare and education (Meskó & Topol, 2023; Farrelly & Baker, 2023; Pretorius & Cahusac de Caux, 2025). The inherent political and social ideologies embedded within AI models pose an additional challenge, as these tools may inadvertently propagate specific worldviews (see, e.g., Christodoulou & Iordanou, 2021; Pretorius et al., 2025).

The increasing adoption of GenAI in research also accentuates the persistent issue of the digital divide (see, e.g., Junhong & Bozkurt, 2025). Unequal access to advanced AI tools, as well as disparities in AI literacy, creates a distinct disadvantage for researchers lacking high-performance computing infrastructure or specialised expertise. This disparity limits the participation of underrepresented groups and threatens to solidify existing inequalities within academia. The concentration of research power in well-resourced institutions or countries is a potential consequence (Lutz, 2019; Kitsara, 2022). Additionally, the cost and infrastructure requirements of GenAI can marginalise researchers in less affluent regions (Spyroglou et al., 2022).

The rapid advancement and deployment of GenAI systems raise significant concerns about their environmental sustainability. The computational power required to train and run large AI models results in substantial energy consumption and associated carbon emissions (see, e.g., Luccioni et al., 2024). These environmental costs are often overlooked, and therefore, more energy-efficient AI architectures and deployment strategies are required. Researchers should be cognisant of these costs and consider the trade-offs between model performance, energy consumption, and the suitability of tools for specific research use. Environmental impact adds another layer of complexity to the ethical considerations surrounding GenAI, necessitating a holistic approach that balances technological advancement with ecological responsibility.

Despite the challenges, the responsible application of GenAI offers significant societal benefits. Novel AI tools are empowering neurodivergent individuals by enhancing communication and reducing misunderstandings (Arango et al., 2024). For example, AI-powered writing assistants can aid in understanding and adjusting the tone of written communication, promoting clarity and minimising misinterpretations. GenAI's capacity to create personalised learning experiences can be particularly transformative, tailoring educational content and delivery methods to individual needs and learning preferences (Kestin et al., 2024). Moreover, AI-powered tools with functionality such as real-time captioning, transcription, and sign language interpretation can significantly enhance accessibility for individuals with disabilities. These technologies facilitate greater participation in various aspects of society, including education and the workforce (Chemnad & Othman, 2024; ZainEldin et al., 2024). For example, Pretorius et al. (2025) recently demonstrated that GenAI holds potential as a tool for decolonising academic communication by empowering multilingual doctoral students to express their ideas in ways that challenge the dominance of English-centric scholarly norms. This type of approach to using GenAI democratises access to information and empowers learners of all ages and stages to pursue their interests and achieve their full potential.

While concerns about GenAI's negative impacts persist, it is important to recognise its potential to reshape the landscape of opportunities. For example, in terms of employment, while some jobs may be displaced, GenAI also has the potential to create new types of jobs and augment existing ones, particularly in developing countries (Mannuru et al., 2023). Proactive and responsible development and deployment practices, coupled with investments in upskilling and reskilling programs, are necessary for harnessing GenAI's transformative power while mitigating its potential downsides (Morandini et al., 2023). The inherent capacity of GenAI to remedy its own negative social impacts is also often underemphasised. Advancements in AI-powered privacy-enhancing technologies can help safeguard sensitive data and protect individual privacy (Abolaji & Akinwande, 2024; Muhammad et al., 2023; Yanamala, 2023). By automating routine tasks, GenAI can free up human workers to focus on more creative and strategic endeavours, fostering a more fulfilling and productive work environment (Haase & Hanel, 2023). By addressing language barriers, improving digital literacy, automating routine tasks, and providing cost-effective coaching, GenAI can contribute to economic growth and social development.

The deployment of GenAI in research, therefore, necessitates a balanced approach, acknowledging both its potential to perpetuate social inequalities and its capacity to contribute positively to research practices. In engaging with these tools, researchers must critically consider the societal impacts and ensure that the use of GenAI in research promotes inclusivity and equity, while minimising its negative impact on society.

H - Harness understanding of the technology

In a world increasingly driven by AI technology, it is crucial that researchers understand how specific AI systems operate, including their capabilities and limitations. Such knowledge is not merely beneficial but essential, as it plays a crucial role in evaluating the information generated by these systems (Solomon & Davis, 2023). Through understanding the underlying mechanisms and algorithms of AI systems, individuals develop effective AI literacy (Markus et al., 2024; Pretorius & Cahusac de Caux, 2025). AI literacy encompasses a range of skills that enable individuals to critically assess AI technologies, interact with AI systems, and use AI effectively

as a tool (Long & Magerko, 2020; Pretorius & Cahusac de Caux, 2025). This involves not only basic usage but also the critical evaluation of AI outputs to assess their quality and accuracy (Almatrafi et al., 2024; Pretorius, 2023; Pretorius & Cahusac de Caux, 2025). Ultimately, mastering these skills ensures responsible and informed engagement with AI technology.

Furthermore, harnessing an understanding of how AI systems function is essential for evaluating their ethical implications (Bankins & Formosa, 2023). Grasping the underlying mechanisms and algorithms facilitates the identification of potential ethical considerations inherent in the generated content. Such knowledge ensures that AI outputs adhere to established ethical standards and do not inadvertently result in negative consequences (Lund et al., 2023). Additionally, a thorough understanding of AI systems promotes a more responsible and informed use of these technologies, guiding researchers toward ethical and effective practices.

By harnessing this technological understanding, researchers can more effectively navigate and utilise AI systems to their fullest potential. This knowledge empowers them to make informed decisions about AI deployment and to maximise the technology's benefits while remaining mindful of its limitations and challenges. Ultimately, developing a robust understanding of AI allows researchers to manage the complexities of this technology more effectively, ensuring that its application is both responsible and beneficial.

I - Indicate use

It is imperative that researchers clearly indicate how GenAI has been utilised in their work. Research suggests that tools that currently purport to detect AI-generated or adapted text have significant limitations regarding accuracy and reliability (see, e.g., Weber-Wulff et al., 2023). This calls for transparency by authors and is crucial for several reasons (Crawford et al., 2023). Firstly, it addresses issues of authorship by distinctly differentiating between human-generated and AI-generated content, thereby ensuring that credit is appropriately allocated. This clarity is essential in academic and professional contexts where the integrity of authorship is paramount (Perkins, 2023). Secondly, transparency regarding AI usage can mitigate potential copyright issues by ensuring that all sources and contributions are properly acknowledged (Bukhari et al., 2023). Finally, openly disclosing the use of AI fosters trust and credibility, both within the researcher's professional community and with the broader public. It demonstrates a commitment to ethical standards and accountability, indicating an awareness of the implications and responsibilities associated with employing advanced technologies. By explicitly stating the role of AI in their work, researchers contribute to a culture of openness and ethical rigour.

Researchers can draw on a range of practical guidelines to appropriately indicate their use of GenAI in scholarly work. For instance, disclosures with clear documentation of the level of GenAI usage have been shown to positively contribute to transparency and academic integrity (Hosseini et al., 2023). Furthermore, a complete grasp of institutional and/or publisher guidelines assists in addressing copyright issues and the "essence of academic discourse" (Carobene et al., 2024, p. 835). In addition, authors are encouraged to ensure a working understanding of ethical issues and conundrums associated with GenAI usage (Bearman et al., 2022). There is also guidance for citing GenAI content in referencing guidelines such as those provided by the American Psychological Association.

Although guidelines already exist to help researchers outline the use of GenAI in their work, we suggest that more guidance is needed in this area. Researchers need to develop and codify both general and discipline-specific GenAI methodologies, encompassing all aspects of the research process (e.g. project conceptualisation, literature review and organisation, data collection and analysis, and write-up and dissemination). These methodologies need to incorporate systematic processes for documenting the ethical use of GenAI, including the tools used, their application, and the extent to which they were utilised, as well as outlining adherence to relevant ethical guidelines and/or frameworks.

C - Critically engage with outputs

The responsibility for the accuracy, ethics and standards of disseminated research outputs ultimately rests with the authoring researcher, not the technology platform. GenAI technologies, whilst powerful, are not infallible. The de facto understanding of truth that AI models operate on is known as "ground truth" or "fundamental truth", and this (human) construction effectively becomes the "reality" against which developers measure the model (Munn et al., 2023, pp. 2-3). In this regard, system designers who select the limited data on which the system is trained and who provide operational parameters ultimately hold the power to determine the kind of outputs that are generated or not (Crawford, 2022; Munn et al., 2023). This means that AI models may generate inaccurate, biased, or inappropriate outputs, and researchers must therefore critically engage with and revise all content generated by artificial intelligence. Critical engagement entails being mindful of how knowledge is acquired and justified within specific disciplines, as well as how risks can be proactively mitigated. The recent work by Pretorius et al. (2025) exemplifies this approach, with the researchers critically acknowledging the Western-centric biases embedded within GenAI training datasets and adopting methodological strategies to mitigate these biases in their own applications of GenAI.

By critically engaging with and revising outputs, the researcher can ensure that their contribution to knowledge is reliable and valid. This necessarily entails making informed judgements regarding the truth value or accuracy of generated content in relation to their specific discipline areas. Roux (2024) explains that testing for truth involves carefully evaluating whether ideas are supported by reliable evidence and whether they logically fit with other related or interconnected ideas. In the context of GenAI, this involves testing outputs to ensure that GenAI tools inform and enhance the researcher's work, rather than supplanting their intellectual, ethical and creative processes. Criticality in this regard is what allows a researcher to leverage the unique

proficiencies of GenAI tools whilst maintaining epistemic responsibility (see, e.g., Pretorius & Pretorius, 2025). In this manner, the researcher retains control over the quality and direction of their work, ensuring that their academic and professional expertise and judgement are utilised effectively to complete the final product.

A - Access secure and protected versions

Although GenAI tools have significant potential to transform research efficiency, their reliance on large-scale data processing can pose serious risks to privacy and security (Chen & Esmaeilzadeh, 2024). It is, thus, important for researchers using GenAI to evaluate and assess the security of their chosen GenAI tool(s), considering copyright, intellectual property, privacy, legal, ethical and research integrity responsibilities. This helps to ensure the integrity of their work and avoid issues related to plagiarism and unauthorised use of proprietary information (Golda et al., 2024).

GenAI tools learn from curated internet datasets, which can include publicly available, copyrighted, and pirated materials, user inputs, previous outputs, and user feedback (O'Leary, 2013; Fui-Hoon et al., 2023). Literature provides a variety of cautionary tales associated with data leakage across various settings, ranging from sensitive medical data to accidental disclosure of confidential company information and attackers entering fake data to undermine software and systems developed using GenAI (see, e.g., Chen & Esmaeilzadeh, 2024; Gupta et al., 2023; Khanna, 2024). As such, when evaluating the security offered by each tool, users should consider the risks and challenges associated with data sources used to train the tool, as well as the features offered to protect data input into the system against leakage (Shi, 2023).

There are many GenAI tools available (Panda & Kaur, 2024). Well-known, publicly available and free products, such as ChatGPT (OpenAI), CoPilot (Microsoft) or Claude (Anthropic), are made available to users under specific privacy policies, terms of service or use, and other legal agreements. Most of the free tools also offer paid versions, which promise extra security and privacy. Many higher education institutions subscribe to these more secure versions, as they often provide increased levels of security, ensuring a higher degree of safety and adherence to research integrity. Researchers should investigate the appropriateness and relevance of these secure versions for their particular research context.
Approaches currently employed by developers to address privacy and security concerns include Privacy-Preserving Techniques (PPTs), Adversarial Defense Mechanisms, and Regulatory Measures and Policies. These techniques serve to preserve privacy, limit the exposure of sensitive information, and counteract malicious attacks. However, each technique has limitations, often necessitating a trade-off between privacy and utility. As such, a compelling need persists for the development of more robust and advanced security measures for these systems (Golda et al., 2024).

Regardless of the product cost, vendor reputation, or claims in policies and terms, a risk of data leakage or misuse remains. Developing a verification strategy to ensure that no data leaks from a system owned by a third-party provider is challenging, and consequently, it is difficult to evaluate the security guarantees offered (Gorcenski, 2023). It is possible to operate a GenAI system privately, for example, by using open-weight large language models such as Llama (Meta). While deploying such systems has traditionally required significant technical expertise and financial resources, recent software solutions, such as LM Studio, have simplified the process, making it easy and free of charge to run open models on a local computer. It should be noted, however, that these capabilities would be limited by the local hardware's computational resources.

When evaluating the security risk of using any GenAI tool, researchers should consider the sensitivity of the data being entered, recognising that even the most secure systems are vulnerable to unintended and malicious data breaches (Chen & Esmaeilzadeh, 2024). Researchers are encouraged to investigate the use of secure and protected versions, such as those offered through institutional subscriptions and models that operate on local hardware, which adequately meet ethical requirements. Extreme care should be taken to avoid disclosing any sensitive personal information, confidential commercial/organisational information and data associated with national security, noting that even anonymised patterns in data could potentially reidentify individuals if models are improperly handled after training.

L - Look at user agreements

Finally, it is essential that researchers carefully review the user agreements, including the terms and conditions of the AI tools they are employing, to make informed decisions regarding their use. These documents often contain critical information about the ownership of inputs and outputs, which can significantly affect rights to the content created using the AI tool. In some user agreements, the terms regarding ownership of the output (i.e., the content generated by GenAI) are unclear. For instance, does the user or the AI company own the output? This is particularly important for commercial applications, where researchers may wish to protect AI-generated works.

Understanding the ownership of data and the resulting outputs is crucial for maintaining control over the researcher's intellectual property and ensuring their work is not exploited without their consent. Additionally, user agreements provide details on data storage, which has significant implications for privacy and security. Although the Italian Data Protection Authority emphasised that the widespread collection and storage of personal data for ChatGPT's training lacks a solid legal basis (Powell, 2023), various user agreements allow for input and/or output data to be used for model training, which further adds to privacy concerns. Additionally, while some platforms offer users the ability to adjust privacy settings to prevent data from being stored or used for training purposes, many users may be unaware of these options or unsure of how to configure them appropriately. Questions also remain about

the extent to which these settings effectively guarantee confidentiality. The lack of transparency in how user data is handled, stored, or potentially retrieved means that even with user-selected privacy preferences, the confidentiality of sensitive research data may not be fully assured. Thus, researchers should carefully examine these aspects of the agreements to ensure that the AI tool complies with relevant data protection regulations within their context and that their data is managed in a manner consistent with ethical research standards and legal obligations.

Some agreements give companies the right to change terms at any time, potentially leading to situations where users unknowingly agree to new conditions that alter how their data is used or who owns the generated content. For instance, OpenAI's Terms of Use include a clause stating that the company reserves the right to change its terms at any time (OpenAI, 2023). The same applies to Google, which also reserves the right to adjust its terms and services as needed (Google LLC, 2024). Users are bound by these updated terms by continuing to use the service, and while OpenAI may provide notice for some changes (such as price increases), other modifications can be implemented without direct communication. Users might not fully realise when and how the terms have changed, which could affect how their data is processed or how AI-generated outputs are owned.

In summary, it is essential for researchers to carefully review the terms of service and privacy policies when using GenAI applications, as these can have significant implications for data privacy and intellectual property. They should also regularly review the terms and conditions, as these may change during their engagement with the GenAI tool. Researchers must adhere to the research integrity requirements of their project and ensure that what they are agreeing to meets the specific requirements of their particular situation. This thorough scrutiny of terms and conditions helps prevent potential legal issues and enhances the researcher's ability to use GenAI tools responsibly and ethically, safeguarding their work and the sensitive information involved.

Conclusion

The ETHICAL framework presented in this article serves as a foundational resource for researchers navigating the ethical challenges associated with GenAI. While existing literature and guidelines outline the ethical issues researchers need to consider, this framework progresses beyond awareness to practical action. The ETHICAL framework explicitly equips researchers with actionable principles, providing clear guidance on the ethical use of GenAI in research, thereby supporting both integrity and impact.

Each component of the ETHICAL framework represents a call to action. Researchers are urged not just to consider but to actively *Examine, Think about, Harness, Indicate, Critically engage, Access,* and *Look* at aspects of their GenAI use. By integrating these actions into their research workflows, researchers will foster transparency, mitigate risks, and uphold the social responsibility integral to academia. The framework emphasises that ethical GenAI use is not passive – it is a process that demands critical, ongoing engagement with each tool's functionalities and limitations, coupled with an informed understanding of legal and social implications. The significance of this framework extends beyond the realm of research. For instance, in teaching and learning environments, the ETHICAL framework could guide both educators and students in the ethical use of GenAI within both assessment and feedback. As educational institutions increasingly integrate AI-driven tools into their curricula, the framework can offer structured guidance for the development of ethical AI literacy, supporting students, educators, and administrators in engaging responsibly with technology in their teaching and learning practices. It also provides insights for regulators, research institutions and GenAI developers, guiding these stakeholders to better support researchers and/or design GenAI-enhanced research tools more effectively.

However, implementing this framework brings challenges. It must be acknowledged that integrating these principles consistently may require time, resources, and institutional commitment, particularly in striking a balance between practical application and existing institutional guidelines. There is also the potential for ethical GenAI use to become incidental if these principles are not actively championed, risking erosion of trust, inclusivity, and accountability within both research and educational contexts.

As such, the ETHICAL framework should be viewed as a guidepost, with researchers encouraged to critically reflect on its application, identifying which components may prove most challenging to implement and considering the necessary resources to uphold ethical standards. Ultimately, by committing to this framework, researchers contribute to shaping the future of AI-enhanced scholarship in a way that reinforces ethical responsibility for future generations.

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The present and future directions of metaverse, artificial intelligence, and second life environments in new language education within higher education: A systematic review

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Abstract

The Metaverse, Artificial Intelligence (AI), and Second Life (SL) environments signify the commencement of the next phase in educational revolution, which offers the opportunity to seamlessly integrate digital and physical realms in a multiuser immersive setting. Despite the substantial potential for harnessing the Metaverse, AI, and SL in the domains of learning and teaching, a notable deficiency exists in research investigating the benefits, challenges, and solutions of these technologies for language acquisition. This review aims to address this deficiency by examining the potential advantages, challenges, and future directions of these technologies within the context of language education. It analyses relevant studies from ScienceDirect, Emerald, SAGE, SpringerLink, IEEE Xplore, and JSTOR, which focus on studies from 2011 to 2025. Key findings reveal the benefits of Metaverse, AI, and SL, such as improved awareness, knowledge access, motivation, engagement, and support. These technologies contribute significantly to enhancing language learning and pedagogy. The challenges include ethical concerns, socio-emotional issues, and a lack of proficiency in educational virtual technologies. Nevertheless, the study provides constructive implications and solutions for integrating these technologies into language education, enhancing understanding of their benefits in new language education, while recommending how to incorporate them into higher education pedagogy.

Introduction

Second language (L2) education has increasingly attracted interests in higher education institutions because global organisations emphasise the importance of equipping students with multilingual competencies (Hwang & Chien, 2022). The demand for multilingual proficiency has consequently driven a rise in the number of educators who specialise in foreign language instruction (Williams et al., 2019). In response to this need, universities worldwide have expanded their offerings of distance-based language courses, which have resulted in significant improvements in both quality and accessibility. Simultaneously, pedagogical strategies are undergoing profound transformations through the adoption of advanced educational technologies (Hwang & Chien, 2022; Williams et al., 2019). These developments align with broader trends in higher education that prioritise the implementation of digital tools to enhance language teaching and learning.

Extended Reality (XR) technology has emerged as one of the most transformative in this domain. XR is a broad, overarching term that includes Mixed Reality (MR), Virtual Reality (VR), and Augmented Reality (AR) technologies. It refers to any segment of the reality-virtuality continuum that combines immersive digital elements with real-world components. This continuum spans from AR, where virtual elements are superimposed onto the physical environment, to augmented virtuality, which integrates real-world objects into a predominantly virtual space, facilitating novel interactive applications (Tegoan et al., 2021). XR technology enables the design of integrated environments that amalgamate real and virtual components, thereby promoting engaging and realistic experiences across all levels of language instruction. This advancement underscores the potential of XR as a substantial enhancement to the ongoing evolution of language teaching and learning.

Metaverse, AI, and SL environments are considered the next evolution of the educational revolution, as they create immersive, interactive learning spaces. The Metaverse, a term derived from the combination of two words, "meta", meaning after, and "universe" (Cheng et al., 2022), offers a new realm for education and interaction. AI plays an essential role in these platforms, as it ensures that Metaverse environments operate according to the rules defined by the designer (Hwang & Chien, 2022). Furthermore, SL is a 3D computer-simulated, immersive world where users, such as students, can communicate as avatars for educational, entertainment, or other purposes (Isgor Simsek & Baltaci, 2024). In addition, XR is considered the backbone and essential support system of the Metaverse, merging real and virtual environments to create lifelike, immersive experiences. This combination of immersive technologies makes education more interactive, realistic, and engaging within the Metaverse and SL environments (Tegoan et al., 2024). The rapid growth of Metaverse platforms, which have attracted millions of students and teachers, demonstrates the expanding potential of this technology. A recent study by Saritas and Topraklikoglu (2022) revealed that 42 million people globally are active Metaverse users, which underscores its growing presence. Immersive technologies, including XR, are transforming education by creating new communication paradigms (Tegoan et al., 2021). These digital reality environments are gaining interest from educators, who see their potential to overcome the fundamental limitations of traditional education (Saritas & Topraklikoglu, 2022).

Despite growing interest in these immersive technologies, a noticeable gap remains in research regarding their application in language education (Zhai et al., 2024). Specifically, there is a lack of extensive studies examining the effective use of the Metaverse, AI, and SL in language learning and teaching. Additionally, only a few studies have addressed the benefits, challenges, and solutions associated with employing these technologies into new language learning and teaching. To address this gap, the present review aims to outline the potential benefits and challenges, provide solutions to these challenges, and offer clear future directions for the adoption of Metaverse, AI, and SL environments in language education. By undertaking this initiative, this study aims to enhance the comprehension of how immersive technologies can be effectively and efficiently utilised within the context of new language instruction and acquisition.

In alignment with the aims, three research questions are articulated to direct this systematic review and analysis of pertinent research papers that contribute to an enhanced understanding of the potential benefits and challenges associated with the implementation of immersive technologies in the context of new language learning and teaching.

RQ1: What are the benefits of using the Metaverse, AI and SL for learning and teaching a new language in higher education?

RQ2: What are the privacy, ethical and social concerns associated with the use of the Metaverse, AI, and SL environments for learning and teaching a new language in higher education?

RQ3: What are the future directions of applying the Metaverse, AI and SL for learning and teaching second languages within higher education?

Systematic review methodology

This study adopts the guideline of Wolfswinkel et al. (2013) for conducting the systematic review of the literature which include (a) defining the scope of the review, (b) searching the literature, (c) selecting the sample, (d) analysing the sample, and (e) presenting the findings. This review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines (Page et al., 2021), which are appropriate for the qualitative nature of this study and ensure transparency, replicability, and methodological rigour. The review focused on peer-reviewed studies that examined the application of the Metaverse, AI, and SL in language education within the higher education context.

In the initial stage, six major academic databases, such as Emerald, ScienceDirect, SAGE, SpringerLink, JSTOR, and IEEE Xplore were selected. These databases were chosen for their scholarly credibility and broad coverage of peer-reviewed research in education, educational technology, and applied linguistics. The search strategy combined keywords and Boolean operators, supplemented with Medical Subject Headings (MeSH) terms where applicable. Search strings included combinations such as 'Metaverse' AND 'Second language' OR 'AI' AND 'teaching language' OR 'learning a second language' AND 'immersive educational environment' OR 'virtuality' AND 'new language learning' OR 'virtual online learning environment' AND 'challenges in teaching a new language'. The time range of the search covered articles published between 2011 and 2025. The inclusion and exclusion criteria are summarised and presented in Table 1. The second stage involves running the search query within the selected databases for retrieving the search results using the above pre-defined search strings. The initial search results were screened at the title and abstract level to remove clearly irrelevant records. To reduce selection bias, the screening and study selection process was carried out by three independent reviewers, with disagreements resolved through discussion until consensus was reached. This initial search provides a general understanding on the application of the Metaverse, AI, and SL in language education within the higher education. Studies not published in peer-reviewed journals, articles without a clear focus on language education, and those studies which fall outside 'learning technologies', 'Metaverse', AI technology', 'SL platform', 'new language', and 'teaching and learning languages' were excluded. The next stage involves an in-depth analysis on the potentially useful publications by reading the full article. In this last step, the most important aspect was to evaluate the full article for ensuring its relevancy to the research questions. Following PRISMA guidelines, studies were identified, screened, and assessed for eligibility. Figure 1 shows the PRISMA diagram for illustrating the procedures followed in the systematic review process.

Table 1: Inclusion and exclusion criteria.

Inclusion	Exclusion
Research studies on Metaverse, SL and AI environments	Research studies that are not peer-reviewed.
Research studies include learning and teaching a new language.	Research studies not published in the English language.
English language	Research studies are abstracts, reports, and posters.
Peer-reviewed studies from 2011- 2025	Papers falling outside 'learning technologies', 'Metaverse', AI technology', 'SL platform', 'new language', and 'teaching and learning language'.
Research employing robust methodologies is essential.	Published before 2011.

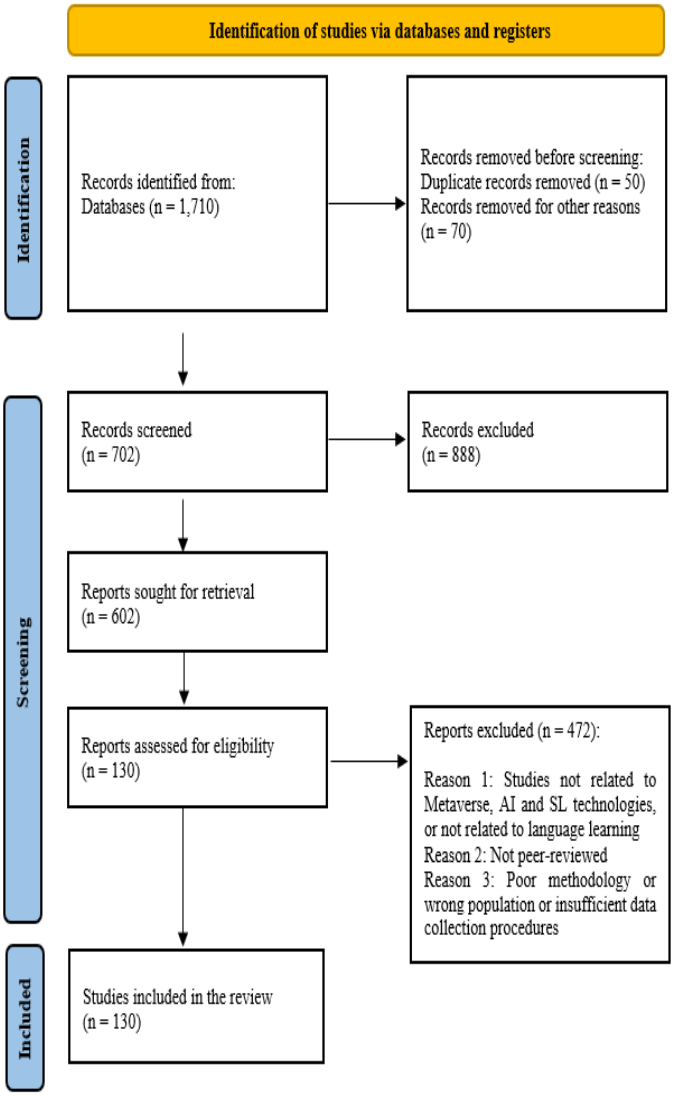

Figure 1: PRISMA flowchart.

Data analysis and synthesis

A data extraction sheet was designed to record study characteristics (first author, year), publication details, research aims, methods, participants, technologies studied, and key findings. The extracted data were then thematically analysed in relation to the three research questions, which ensured alignment between the review outcomes and the stated objectives. This review comprised the collection, identification, analysis, and reporting of data. A six-step process was employed to identify the recurring themes. Firstly, a thematic analysis was undertaken to achieve a comprehensive understanding of the data. Subsequently, initial codes were developed. In the third and fourth stages, sub-themes were discerned and examined. In the fifth stage, pertinent concepts were compiled. Finally, in the concluding stage, the data were reviewed to ascertain their relevance to the objectives of this study (Daud et al., 2021). This review has been created to summarise the pedagogical adoption of the Metaverse, AI, and SL environments in language learning and teaching.

The initial methodological quality of the included studies was assessed using the qualitative research method. The ROBIS (Risk of Bias in Systematic Reviews) tool (Whiting et

al., 2016) was used to assess risk of bias in the systematic review. Both Boolean operators and, where available, MeSH terms were used to enhance the comprehensiveness of the search. The search terms included combinations such as: 'Metaverse' AND 'Second language' OR 'AI' AND 'teaching language' OR 'learning a second language' AND 'immersive educational environment' OR 'virtuality' AND 'new language learning' OR 'virtual online learning environment' AND 'challenges in teaching a new language'.

To reduce selection bias, the screening and study selection process was carried out by three independent reviewers who conducted the appraisal, and discrepancies were resolved through discussion until consensus was reached to ensure reliability. A copy of the data extraction template is provided in Appendix 1. Studies were not excluded based on appraisal scores; instead, the results of the assessment informed the interpretation of the findings. As the majority of included studies employed qualitative or mixed-method designs, a quantitative meta-analysis was not performed. This review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines, which are appropriate for the qualitative nature of this study and ensures transparency, replicability, and methodological rigour.

Results

This systematic review offers a valuable opportunity to shed light on the benefits of applying Metaverse, AI, and SL technologies for learning and teaching new languages in the education sector. The research studies that emerged from the databases have undergone a two-step screening process. Initially, a review of the titles and abstracts of the retrieved papers is conducted to determine their compliance with the inclusion criteria (Regmi & Jones, 2020) and to remove records that are clearly irrelevant to the scope of this review. Subsequently, the full text of the studies meeting the inclusion criteria was reevaluated and obtained through the database search to ensure that their content, methodology, and results aligned with the research objectives. A total of 1,710 records were identified through electronic databases, including 41 studies from Emerald, 33 studies from SAGE, 399 studies from SpringerLink, 31 studies from JSTOR, 184 studies from ScienceDirect, and 1,022 studies from IEEE Xplore. These records were subsequently narrowed down to 822 studies following thorough screening, examination, and the removal of duplicates and irrelevant studies. During the screening stage, 888 records were excluded as duplicates or because they were unrelated to the scope of this review. Following a suitability assessment, 602 full-text articles were evaluated for eligibility, and 472 were excluded for the following reasons: not peer-reviewed, poor methodological quality, wrong population, not directly related to Metaverse, AI, SL, or language learning, inappropriate use of meta-analysis, or insufficient data collection procedures. Ultimately, 130 studies met the inclusion criteria and were incorporated into the final synthesis. Appendix 1 presents a summary of the challenges, influencing factors, research methodologies, delivery methodologies, drivers and key findings.

Figure 2 illustrates the total number of published papers across various databases. The findings show that the majority of papers were published in the IEEE Xplore database, while JSTOR had the fewest. SpringerLink ranked second, followed by ScienceDirect, Emerald, and SAGE databases.

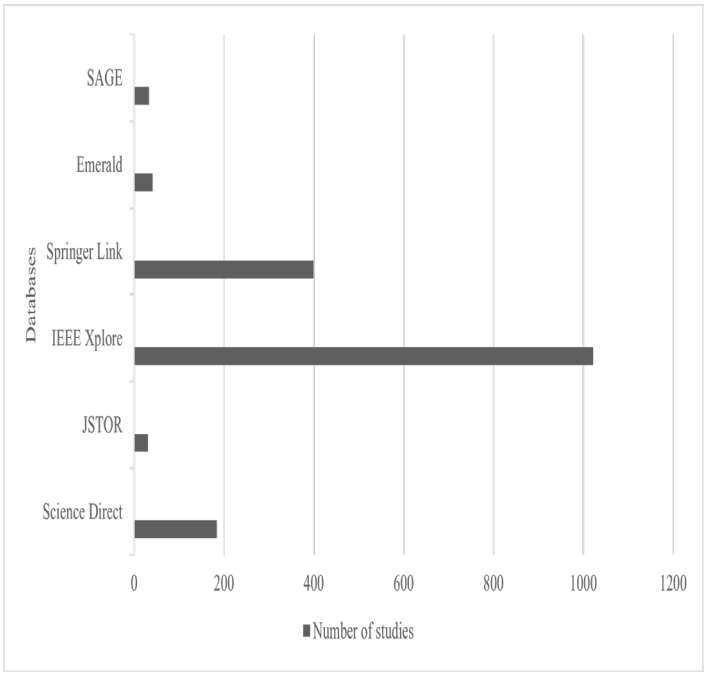

Figure 2: Distribution of the selected academic databases and the total number of publications.

Furthermore, Figure 3 illustrates the number of studies retrieved from six academic databases as part of a systematic literature review. IEEE Xplore produced the highest number of studies, followed by SpringerLink and ScienceDirect, likely due to their stronger emphasis on research related to the Metaverse, Second Life, and AI applications in language education. In contrast, Emerald, SAGE, and JSTOR yielded fewer studies, possibly due to their more limited alignment with the review's thematic scope and differing methodological orientations.

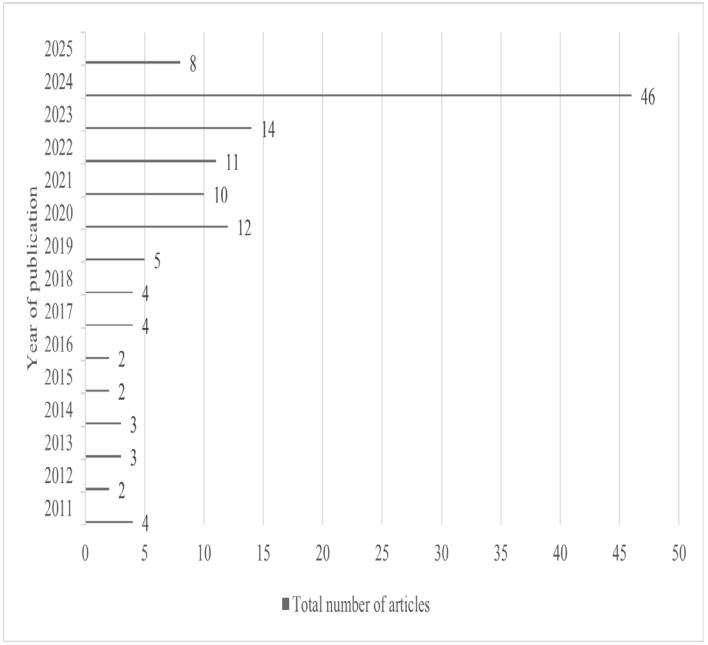

Figure 3: The distribution of the total number of studies published annually from 2011 to 2025.

This review distinguished four central notions from the studies on the benefits and implementation of Metaverse, AI and SL technologies in higher education. These are (a) addressing privacy concerns, security problems and ethical considerations, (b) accelerating language learning and teaching improvement and progress, (c) supporting students' behaviour, fluency, awareness and engagement and (d) invoking students' motivation and attention. Furthermore, some challenges relating to using Metaverse, SL and AI environments were identified. The difficulties arise from issues related to the Metaverse, SL, and AI devices and applications, as well as the limitations of the foreign language education system.

Addressing some privacy concerns, security problems and ethical considerations

With the expected rise in the number of foreign language learners globally, it is necessary to utilise immersive technologies to enhance teachers' tutoring duties and support learners who face limitations, such as limited storage capacity. Students often need to save their sensitive personal work (Kamenskih, 2022), such as academic records, in larger storage capacities that are easily accessible for use and sharing. This sensitive data can be stored in the cloud and other secure locations that protect it from destruction and unauthorised access by third parties. Hwang and Chien (2022) noted that utilising the Metaverse for educational purposes addresses several potential ethical issues commonly encountered in traditional study environments, including cheating, bullying, privacy concerns, offence, security breaches, and educational inequality. Moreover, by utilising Metaverse-based educational settings, students can have continuous learning opportunities without being limited by time or physical space. In an AI environment, the Metaverse technology provides students with direct feedback, comments on their work, immediate assistance and prompts to enhance training and learning efficiency. For example, AI can be a tutor for EFL students who can receive feedback, answers and suggestions regarding their English writing skills. Kovacs (2016) demonstrated that some researchers have pointed out that MUD object-oriented (MOO) environments might be effective for quiet and shy students who cannot participate in real-life contexts. They become more successful in using the MOO environment and are more interested in learning new languages. Meanwhile, SL has addressed the most significant obstacles to engaging in the SL and Avatars environments that prevent students from developing their foreign language efficiently, including behaviours such as fear of negative criticism and shyness (Garcia & Silva, 2018). The appearance of the avatar character could be created easily by the students. Therefore, they can initiate learning experiences independently (Salmon, 2009), which can reduce anxiety and stress, and raise learning engagement and motivation (Ushioda, 2011). Kovacs (2016) demonstrated that some researchers have pointed out that the MOO environment might be effective for quiet and shy students who cannot participate in real-life contexts. They become more successful in using the MOO environment and are more interested in learning new languages. Furthermore, academics can provide learners with immersive experiences by finding primarily target-language environments where users can practice their new language skills and learn about the target culture and background.

Accelerating language learning, teaching improvement and progress

One hundred and thirty studies reported that Metaverse, SL, and AI-based education had successfully facilitated learning and teaching in universities and schools (Canto et al., 2013; Dawilai et al., 2025; Liou, 2012; Suo, 2024). The adoption of XR and AI offers transformative potential for second language learning by providing immersive, interactive, and personalised experiences (Zhou & Divekar, 2025). For example, Hwang and Chien (2022) explained that by using the Metaverse environments, English foreign language (EFL) students could receive feedback and suggestions regarding their English language writing and utilise the AI tutor as an immersive tutor. Dong et al. (2022) pointed out that AI technology has contributed to the creation of new language learning and teaching across a wide range of fields, such as Robot Assistants, Chatbots, holograms, Seeing AI, Vidreader, Classcraft, 3D and other AI-based virtual programs were developed to assist both teaching staff and students in using and improving the educational system. Hwang et al. (2020) provided a definition and examined the roles of AI in education from the perspective of educational needs. The authors explained that AI-based education is becoming a primary research focus in foreign language learning and computer-assisted teaching, which leads to better writing outcomes than those achieved through traditional instruction. Tuncer and Simsek (2015) described 3D VLEs as computer-generated displays that enable users to experience a sense of presence in an environment other than their current one and interact with that technology. 3D multi-user virtual environment (3D MUVE) can create a sense of presence among peer students through their avatars in a 3D environment, facilitating real-time communication that can ease connection building, student motivation, and engagement. Students can be presented in this environment by making a new character as an avatar (Ushioda, 2011). The appearance of the avatar character could be created easily by the students. Therefore, they can initiate learning experiences independently (Salmon, 2009), which can reduce anxiety and stress while increasing learning engagement and motivation (Ushioda, 2011). Moreover, Haristiani (2019) believed that integrating AI-powered chatbot technology could facilitate language learning, enhance students' understanding of lectures, and increase confidence in their language learning experience through less direct interaction with human teachers.

Supporting students' behaviour, fluency, awareness and engagement

Prior studies (Dong et al., 2022; Goda et al., 2014) have investigated how students who are learning English as a foreign language are interested in using virtual English chatbot tutors, which enable learners to form inquiring mindsets and increase their engagement and awareness of critical thinking. Dooly and Sadler (2013) introduced the SL environment and immersive online collaborations that enhanced educator

development through opportunities unavailable in some traditional educator education classrooms, enabling learners-educators to establish better connections between theory and practice. Learners-educators became more professional, engaging in the creation of better lessons and transitioning from knowledge transmission to knowledge transformation. Tuncer and Simsek (2015) demonstrated that the SL environment enables its avatars to utilise body language, which facilitates communication and interaction among avatars, and from which language education and distance learning applications may also benefit. With this real-time synchronous interaction, students can create groups, learn in collaboration, and engage in entertainment. Therefore, the students can attend activities more positively, supporting their foreign language learning. Emerging models of Metaverse-enabled online education possess the potential to address the issues and limitations inherent in traditional 2D platforms. Meta-education can consistently deliver essential hybrid formal and informal active learning and teaching experiences, expand online 3D virtual campuses, and develop contemporary curricula (Mystakidis, 2022). In essence, the Metaverse platform is anticipated to induce a substantial transformation in the domains of learning and teaching, especially within higher education studies. For example, Molka-Danielsen et al. (2007) clarified that virtual and immersive worlds, such as Linden Labs SL, could be established as an opportunistic platform for future online learning and teaching purposes. Over 160 higher education centres, as associates of the New Media Consortium (NMC) forum, have already developed programs and conducted virtual meetings in the virtual world of SL, created by Linden Labs. Many higher educational centres have been designed to motivate efficient use of time and reach learners with mobile lifestyles. Still, more current ventures into SL education aim to achieve collaboration between educators while improving the learning process. From a teaching perspective, traditional educational resources such as personnel knowledge, acquaintance, competency, and foundations have been limited. The author described how being capable of accessing distributed teaching resources through immersive worlds, such as SL, can offer advantages compared to other online resources; SL also provides a richly immersive educational environment. That is because SL supports rich virtual educational environments and social interactions and allows open access.

Invoking students' motivation, attention and socio-emotional development

Virtual multimodal teaching and immersive learning can utilise metaverses to enhance the motivation and attention of less proficient students, while also supporting collaboration and language progress (Lee & Kim, 2016). For example, 3D MUVE can create a sense of presence among peers through the use of avatars within a 3D setting via real-time communication. This interaction can enhance the development of connections, increase student motivation, and foster engagement. The student can be presented in this environment by making a new character as an avatar (Ushioda, 2011). Alfadil (2020) demonstrated the effects of using the Metaverse platform, which can enhance the quality of immersive learning experiences and develop learners' fluency in language learning. For example, the author assured that the 'House of Languages' game, which focuses on language vocabulary acquisition, revealed that students who used it achieved better results in language skills and vocabulary acquisition than ever before. According to Kovacs's (2016) study, it is noted that MOOs (3D MUVEs) have effectively captured the attention of educators. Many MOO platforms were created for learning second languages, such as MOO Rouge, MOO Francais, Schmooze University and Mundo Hispano. As MOOs are majorly text-based, they rely on the educators' sense of community and imagination to create and expand their virtual environment. MOOs are established to cultivate users' creativity. The author also investigated the interactional tools utilised by a language instructor with learners in a second language setting in MUVE of SL, which were employed to generate meaning and communicate effectively with students, including visual addressivity, reception checks, and channel checks. Furthermore, the author observed that although some teachers and researchers are interested in exploring the potential of conducting teaching and learning experiences in MUVEs, there is still a limited amount of research in this area. Within MUVEs, social constructivism provides a useful framework for understanding the role of peer interaction, mutual problem-solving, and community-based engagement in language learning. To complement this perspective, the Technological Pedagogical Content Knowledge (TPACK) framework is employed as a direct theoretical reference (Mishra & Koehler, 2006). TPACK emphasises on the dynamic interplay between technology, pedagogy, and content knowledge and provides a system, a systematic framework to study how immersive technologies, like Metaverse platforms, AI, and simulation-based learning, can be successfully used in language learning. The integration of social constructivism and TPACK provide a coherent theoretical framework for the identified benefits, challenges, and pedagogical implications in this systematic review. SL technology is regarded as one of the most prominent virtual environments among educators. It has drawn the interest of numerous language learners and instructors due to three fundamental aspects: (a) the experience of embodiment or presence that users experience through avatars, (b) the synchronous voice functionality, and (c) its adaptable design capabilities.

Challenges in utilising Metaverse, AI and SL environments

Despite the benefits of the Metaverse, AI, and SL environments for language learning and teaching, some research studies have explained the challenges of applying these virtual environments. For example, Haristiani (2019) argued that while considerable research and development have occurred in the field of chatbots for English language learning, their availability remains limited in specific languages. There are still some privacy concerns and issues of honesty that need to be addressed. Molka-Danielsen et al. (2007) demonstrated that educators should consider technical access problems and new teaching procedures and establish the learning space accordingly. The authors illustrated the issues in distance education that applied to the context of teaching second languages. They suggested that closed systems, such as remotely accessed proprietary

learning management systems, can create a knowledge gap when used to teach foreign languages. Although this system may offer access to large databases on specific subject matter, the closed virtual environments could create an issue, as noted by Dalsgaard (2006). The point of mixing personal learning tools and networked equipment in a closed, controlled environment is a dilemma for the social constructivist theory of learning a new language. Furthermore, Felix (2003) cautioned that, despite meticulous planning, certain educators perceive MOOs as anarchic and find the rapid scrolling of text to be bewildering. The author articulated that, while educators may organise language classes with a high degree of effectiveness, there exists a measure of uncertainty regarding the findings due to the playful characteristics of the MOO and the anonymity that the environment affords to learners. The discourse of academics and the purposes of their roles have been evaluated during the pre-task, task, and post-task stages of task-based classes that implemented the SL environment. Felix (2003) deduced that the tutor must be prepared to provide a positive learning environment that mitigates the negative impact of technical issues during class time and resolve them. Consequently, after the adoption of the MUVE environment, the teaching and learning process becomes more flexible and exciting (Wang, 2015).

Alfadil (2020) assured that research on language vocabulary education using the Metaverse and immersive platforms remains limited. Dwivedi et al. (2022) and Hwang and Chien (2022) asserted that there are still limitations and challenges associated with using Metaverse software for language learning and teaching, including spatial constraints, time constraints, safety concerns during the learning process, and cost issues related to development and adoption. Haristiani (2019) argued that considerable research and chatbot development for English language learning have been created, but this is still limited and not available in other languages. Hwang et al. (2020) found that the challenges extend beyond computer programming skills to include the procedures for simulating the intelligence of human experts. Dahan et al. (2022) reported that the Metaverse platform remains unclear in teaching and learning new languages, and its components are not precisely defined. Bower (2017) explained that while using the SL platform, it can be difficult to identify participants in the class from their Avatar characters. Jeon et al. (2022) encountered some technical limitations of a videoconferencing tool, like Zoom, regarding its temporary nature and the lack of embodied learning in online teaching. The most significant obstacles to engaging in the SL and Avatar environments that prevent students from developing their foreign language efficiently are related to fear of negative criticism and shyness (Garcia & Silva, 2018). This socio-emotional barrier is further compounded by the technical and pedagogical challenge of converting a 3D environment into an effective learning platform, which can limit the support structures needed to reduce anxiety and encourage active participation (Ibanez et al., 2011).

The application of Metaverse, AI and SL in new language education

The application of Metaverse, AI, and SL immersive technologies has advanced remarkably, with their use becoming increasingly evident across various sectors. A growing body of research has explored the transformative influence of AI on language education, emphasising its potential to revolutionise teaching methodologies and learning engagement (Chau, 2025). These investigations encompass AI-driven platforms such as Duolingo, Google Translate, and Prep.com. The findings indicate that AI offers both opportunities and challenges within educational contexts. AI technology facilitates personalised and adaptive learning experiences, providing immediate feedback that enhances student engagement. El-Zeiny et al. (2023) evaluated the effectiveness of AI-driven storytelling in improving pronunciation skills among non-native Arabic speakers. This research demonstrated the benefits of digital storytelling in fostering both reading-aloud proficiency and learner motivation. Moreover, Wen et al. (2025) highlight how AI can personalise learning experiences, provide instant feedback, and facilitate immersive language practice that enhances learner engagement and proficiency. Further advancing this area, Shao et al. (2022) introduced the AI-based Arabic Language and Speech Tutor (AI-ALST), specifically developed for instruction in the Moroccan Arabic dialect. The AI-ALST supports self-directed pronunciation practice by offering corrective feedback and utilising performance metrics, such as F1-score, accuracy, precision, and recall, to assess pronunciation accuracy. In addition, the role of advanced AI models in education has been explored through the integration of Bidirectional Encoder Representations from Transformers (BERT), a language comprehension model, into language learning applications. BERT provides personalised and immersive experiences across vocabulary, grammar, reading, and writing (Pradhan et al., 2024). Prasad et al. (2024) also examined the effectiveness of Sequence-to-Sequence (Seq2Seq) models with attention mechanisms in evaluating and forecasting the progression of learners of English as a second language, with a particular focus on the unexplored relationship between second language (L2) vocabulary size and speaking fluency, specifically pronunciation.

Deep learning continues to transform language education and assessment, providing educators with robust tools for teaching a second language. According to Gay and Gervais (2025), while innovative technologies still developing and achieving widespread adoption, they open new opportunities for educators to enrich the learning experiences of students and improve the evaluation of academic assessments. Basaran (2024) investigated a locally developed AI system using Retrieval-Augmented Generation (RAG) compared with the ChatGPT platform to recognise gender-specific profession names that reflect ongoing advancements in localised applications. Prabakaran et al. (2025) explained the effectiveness of metaverse-based platforms in improving English language proficiency and digital literacy among higher education students. The study found that immersive simulations and interactive scenarios within the metaverse foster collaborative learning, critical thinking, and practical language use, which leads to enhanced learning outcomes.

Ng et al. (2024) noted that immersive environments such as Questverse, the metaverse-based platform being connected with Spatial.io, have also been developed to facilitate interactive language learning experiences. This virtual space enhances teacher-student engagement and supports stage speech training through AI-guided chatbots. Their results indicate that students feel notably more comfortable engaging in oral English exercises guided by an interactive chatbot. AI technology continues to give rise to a variety of new language educational tools across various fields, including Robot Assistants, Chatbots, Holograms, Seeing AI, Vidreader, Classcraft, and other 3D virtual applications that are designed to assist both educators and students in utilising and enhancing the educational system (Dong et al., 2022). The implementation of Metaverse, AI, and SL platform-based smart classrooms, along with virtual teaching assistants, holds substantial potential for advancing language teaching methodologies. However, despite their promise, these immersive tools remain supplementary and have yet to be fully integrated into mainstream curricula. While such technologies offer opportunities to enhance language education, the literature suggests that they do not entirely resolve existing challenges. Studies have identified persistent issues, such as limited language availability in AI chatbots (Haristiani, 2019), technical difficulties, and the need for revised pedagogical approaches (Molka-Danielsen et al., 2007; Zhai & Wibowo, 2023).

Discussion

Technology adoption in language education has been a significant area of interest worldwide in recent years, with numerous studies shedding light on its benefits and challenges. Metaverse, AI, and SL technologies offer a promising enhancement in higher language education. This systematic review is considered one of the most critical current studies investigating and synthesising the advantages and challenges of applying AI, SL, and Metaverse environments in learning and teaching systems. These immersive technologies have the potential to address challenges related to privacy, security, ethical considerations, and socio-emotional well-being. Their adoption has also shown significant benefits in improving language learning and teaching strategies, which result in enhanced students' fluency, awareness, engagement, motivation, and attention. Nevertheless, challenges concerning privacy, social implications, and ethical responsibility remain critical and must be carefully addressed. Moreover, issues such as limited availability of chatbots, high costs, and technical problems necessitate systematic identification and resolution to ensure sustainable adoption in educational practice. Despite these challenges, the adoption of virtual environments will reshape the language education approach, making teaching and learning a more dynamic, stimulating, flexible, attractive, and exciting experience. Overall, the results of this review indicate that the adoption of Metaverse, AI, and SL technologies holds strong potential to positively transform the landscape of language education, especially within the higher education sector.

RQ1: What are the benefits of using Metaverse, SL and AI environments for learning and teaching a new language in higher education?

This study showed that these technologies were integrated to enhance the overall educational experience for both students and teachers. While a substantial number of studies explored the advantages of using the Metaverse and SL in the development of learning and teaching new languages, some research papers also examined concerns and challenges associated with their implementation. These concerns included technical issues, ethical considerations, socio-emotional challenges and potential barriers to the adoption of these technologies in language education. The studies explored the effectiveness of immersive technologies, demonstrating their ability to enhance language engagement, assist learner behaviour, and address various concerns. Many studies focused on AI and chatbot adoption highlighted their potential to augment the teaching and learning experience, offering personalised assistance, immediate feedback, and innovative approaches to language instruction, as well as their advantages in language education (Chau et al., 2025; Dong et al., 2022; Goda et al., 2014; Kim, 2019; Kim et al., 2021; Mayormente et al., 2024; Rani, 2022) It can be observed that there is significant potential in this context. For instance, two case studies (Dong et al., 2022; Zhai & Wibowo, 2023) have explored the high interest of English language students in using virtual English chatbot tutors. These tutors foster inquiring mindsets, enhance active engagement, and raise awareness of critical thinking skills. The authors maintained that AI tutors would revolutionise teaching methods for English courses and create an effective environment to boost students' engagement and fluency in a new language acquisition. Dong et al. (2022) concluded that the development of virtual teaching assistant robots and smart classrooms based on AI has revolutionised English teaching and learning procedures and highlighted students' motivation and awareness.

AI-powered teaching support and chatbot technologies have made vital strides in learning and teaching the English language, but they remain relatively limited in other languages. To achieve the highest standards in the education process, it is vital to integrate these new immersive technologies alongside traditional teaching methods and in multiple languages. This combination can lead to great success in creating a dynamic and excellent learning environment. Meanwhile, Kim (2019), Zhai & Wibowo (2023), and Liu et al. (2025) support a similar perspective that emphasises the importance of AI implementation. Kim (2019) and Haristiani (2019) have introduced the role of AI-powered chatbots in language learning. Most English language students have reported that chatbot AI is useful, enjoyable and practical. This new technology creates an effective educational environment, significantly improving their English grammar skills. Using chatbots also creates a sense of engagement and motivation that positively affects the learning process. The authors assured that AI-powered chatbot technology could enhance language understanding and confidence in the language learning experience by reducing the need for direct interaction with human teachers. As Dong et al. (2022) discussed, AI technology

has made considerable advancements in this field. The authors highlight the significant contributions of AI-based programs, such as Robot Assistants, Chatbots, holograms, Seeing AI, Vidreader, Classcraft, 3D, and virtual tools, developed to support teachers and students in language education. It is suggested that researchers explore the adoption of immersive technologies in language education more thoroughly in their future studies.

In addition, the study results focused on AI technology that enhances language teachers' ability to deliver content and make language learning more engaging and flexible, similar to the project by Hwang et al. (2020). The authors explained the roles of AI-based education from the perspective of educational needs. The authors assured that AI tools are becoming a primary research focus in foreign language learning, which results in improved English writing outcomes. It can be observed that AI-based education can truly assist students in their journey and enhance teachers' content preparation. For example, Al-Barakat et al. (2025) investigated how teachers' TPACK profiles impact their intention to adopt Educational AI Tools (EAITs) in language teaching. The study explained that constructivist pedagogy supports language education through collaborative learning situations and the encouragement of authentic tasks, which strengthen understanding, memorisation of vocabulary, and grammar skills. The findings suggest that enhancing teachers' TPACK can facilitate the effective adoption of innovative technologies in language education. On the other hand, the authors discovered that the challenges are not only related to computer programming skills but also to the procedures of simulating the intelligence of human experts. Based on the empirical evidence on AI technology adoption in education, my perspective is that AI technology can aid language academics in supporting students as they learn new content, thereby facilitating a smooth increase in students' understanding. Teaching and learning by implementing AI technology can overcome the obstacles associated with traditional teaching and learning methods and become more flexible in terms of time and place. Consequently, many changes would lead to greater confidence in learning and teaching languages using AI technology than relying solely on direct human instruction.

Additionally, the SL environment facilitates its avatars in the utilisation of body language, thereby enhancing communication and interaction among avatars. This unique capability may also prove advantageous for language education and distance learning applications, as indicated by Tuncer and Simsek (2015). The authors emphasised that through this real-time synchronous interaction, students can form groups, engage in collaborative learning, and participate in entertainment activities. Baek and Lee (2023) provided a comprehensive overview of the Metaverse, while other studies expanded their investigations to include the SL environment as well. Generally, Baek and Lee (2021) affirmed that both Metaverse environments and the adoption of immersive social networking exert a significant influence on learners' speaking proficiency and comprehension skills. However, the authors noted that EFL teachers found it challenging to adapt to the Metaverse environment and its immersive implementations, due to the increased workload for both students and teachers. It is widely believed that utilising virtual environments in language education holds considerable promise, and there exists a sincere effort to balance practical pedagogical practices with immersive technologies to mitigate potential future challenges. The motivating advantages of the 3D MUVE platform in language education, as illustrated by Grant et al. (2014), include the motivational implications of a 3D MUVE setting, such as SL, for students learning the Chinese language. The 3D MUVE environments possess the capacity to stimulate students' motivation, improve their verbal and oral skills during participatory learning activities, and enhance their language acquisition performance, including word pronunciation. This immersive learning atmosphere bolsters language skills and reduces anxiety within the 3D MUVE context. Lee and Hwang (2022) explored the integration of virtual reality creation with a Metaverse platform to facilitate sustainable and adaptive educational practices. The authors concluded that these transformative experiences offered by VR-Making (herein referred to as VRM) for instructional content bolster pre-service teachers' technological readiness, perceived pedagogical advantages, and digital citizenship. Furthermore, they can facilitate student experiences, thereby ensuring equitable learning opportunities and motivation. It is believed to foster technological readiness among teachers, preparing them for immersive classrooms.

Furthermore, constructive views of SL platforms focus on learning and teaching; one agrees with the potential of virtual reality technologies in language education, as explained by Jeon et al. (2022) and Dooly and Sadler (2013). It is believed that these immersive technologies can create an engaging, flexible, and exciting atmosphere, revolutionising language education. The Korean education system has benefited from the application of virtual technologies, as clearly explained in Jeon et al.'s (2022) work. The author explored the pedagogical affordances of virtual environments. They showed how Korean EFL pre-service teachers gained advantages by noticing the synthesis of qualitative evidence in virtual environment development projects. These virtual educational environments and videoconferencing tools facilitate substantial engagement in technology development, which has the potential to augment participants' autonomy, active learning, awareness, self-efficacy, and motivation to utilise Information and Communication Technology (ICT) affordances in language instruction. This represents a significant advancement in language education. Nevertheless, educators still need to navigate the complexities associated with the effective integration of these technologies into their teaching systems.

Regarding Dooly and Sadler's (2013) perspective, they explained the advantages of SL environments for educator development, focusing on how they bridge the gap between practice and theory. Learner-educators became more professional by creating better immersive lessons and moving to knowledge transformation. I believe this bridge can empower teachers to develop more immersive classes, shifting from knowledge transmission to transformation. It is found that the insight highlighted in Bower's study (2017) aligns with my perspective on the use of 3D and SL in Australia. Bower focused on the benefits of virtual environments to facilitate 3D simulations, role-plays, immersive learning and SL in teaching second languages in Australian and New

Zealand educational centres. It is believed that SL adoption can lead to a positive shift in language education, as this technology can boost students' confidence and proficiency. However, the author explained that it could be challenging to identify participants in the class from their Avatar characters after using the SL platform. It can be observed that it is vital to solve some learning challenges before they adversely affect the learner and educational progress. Similarly, some obstacles pointed out by Jeon et al. (2022) are worth considering. The author examined various technical limitations associated with videoconferencing tools, like Zoom, specifically noting its transient characteristics and the absence of embodied learning within the realm of online education. Additionally, 3D multimodal resources in the SL environment offer foreign language students studying English visual and linguistic support, thereby enhancing language acquisition and pedagogical practices through virtual learning experiences.

Chen (2016) asserted that the SL environment represents a viable learning technique, owing to its prominent features, immersive qualities, and opportunities for co-presence. Nevertheless, the author noted in his project that unforeseen computer crashes and technical difficulties may arise when re-entering the SL in-world. The extension of this discussion to virtual platforms and their advantages is highlighted by Pasfield-Neofitou et al. (2015) and Peterson (2012). They described the SL and 3D multi-user virtual environments as enjoyable and beneficial experiences. These technologies provide stimulating environments for language learners to engage in various valuable social interaction activities. As a result of applying the SL environment in Japanese language learning, limited typing skills and difficulties in navigating the messaging system have been observed, leading to communication breakdowns (Peterson, 2012). This aligns with my thoughts, and an SL environment and a 3D multiuser virtual environment can have highly positive effects on enhancing foreign language education due to their accessibility, flexibility, and effectiveness. Researchers, however, should still focus on conducting future training sessions for academics and students. For example, Dwivedi et al. (2022) highlighted the positive effects of Metaverse, VR, and AI applications on the engagement and performance of European secondary school students. Personally, this case study revealed that the immersive nature of these technologies can significantly support language learning by increasing students' motivation to learn modern foreign languages. That can be a crucial factor for traditional learning due to its accessibility, flexibility and efficiency. However, it is essential to acknowledge that while these immersive technologies offer incredible advantages, they also present challenges.

Table 2 summarises the benefits and challenges of adopting Metaverse, AI and SL technologies in new language education.

RQ2: What are the privacy, ethical and social concerns of using Metaverse, SL and AI environments for learning and teaching new languages in higher education?

As the population participating in the acquisition of foreign languages continues to grow, immersive technologies such as the Metaverse, AI, and SL present valuable resources to enhance instruction and facilitate learning in environments with constrained resources. However, the incorporation of these technologies into higher education also engenders significant concerns pertaining to privacy, ethics, and social interaction.

Table 2: Benefits and challenges of adopting Metaverse, AI and SL technologies in new language. education.

Aspects	Benefits	Challenges
AI and Chatbot Adoption	Offers personalised assistance, immediate feedback, and innovative approaches to language instruction. Reshapes language education, making it more dynamic, stimulating, flexible, attractive and exciting.	Computer programming skills, simulation of human intelligence and technical issues. Limited availability of chatbots, cost complexities and technical issues
SL Platforms in Language Education	Creates engaging, flexible, and existing atmospheres, revolutionising language education. Boosts students' confidence and proficiency, facilitates immersive learning.	Navigating complexities, incorporating technologies efficiently, and overcoming potential obstacles. Also, challenges include identifying participants, overcoming technical limitations, and addressing potential obstacles.
3D Multimodal Resources in SL Environment	Offers visual and linguistic assistance while promoting language acquisition missions.	Technical limitations, ensuring participant identification, and solving potential learning challenges.
3D Muve Platform	Triggers motivation, improves verbal and oral skills and decreases anxiety.	Including adapting to new technology, workload management, and avoiding potential future challenges.
Metaverse environments	Provides a promising approach to new language education, striking a balance between practical practices and immersive technologies. Leads to improved students' fluency, awareness, engagement, motivation, and attention. Solve some issues like depression and disability. Enhances engagement and performance, supports language learning.	Adapting to virtual environments, managing workload and potential future technical challenges. Technical, social, privacy, and ethical issues. Accessibility, flexibility and efficiency, along with acknowledging potential challenges.
VR Creation and Technological Readiness	Facilitates transformative experiences and supports the readiness of pre-service teachers.	Technological readiness, managing workload, and addressing potential future technical challenges.

Addressing these concerns requires a comprehensive strategy that encompasses the establishment of explicit privacy guidelines and the promotion of cultural sensitivity within virtual environments. A robust commitment to equity, inclusiveness, and ethical practices is essential for the responsible adoption of these technologies. Gay and Gervais (2025) suggested that to avoid such adverse effects, the universities should establish a formal feedback

mechanism for immersive technologies. This would assist in ensuring that their policies and practices remain aligned with current applications as well as the rapid development of these innovative technologies in terms of flexibility and sophistication.

According to Tegoan et al. (2024), immersive technologies have significantly contributed to effective language acquisition. However, since these platforms rely on sensitive data from both educators and students, it is imperative to ensure the safeguarding of data security and user privacy. Upholding ethical data practices fosters trust and promotes the sustainable utilisation of these advanced tools in language education.

In accordance with student privacy and data security protocols, students frequently disclose sensitive information and personal data on virtual platforms, including their names, academic histories, preferences, and communication styles. Such data may be susceptible to misuse or unauthorised exposure by unpermitted entities (Kamenskih, 2022). To mitigate this concern, educational institutions must implement robust data protection policies and provide training on cybersecurity measures (Acheampong et al., 2025). Acheampong et al. (2025) emphasised that secure authentication processes, encryption methodologies, and privacy-centric practices are essential for safeguarding both teacher and student data. For instance, authenticity can be verified through the use of digital signatures, while hash function algorithms ensure the integrity of data (Acheampong et al., 2025). Both educators and students should receive training on best practices for managing personal information within virtual environments. Furthermore, Dwivedi et al. (2022) and Hwang and Chien (2022) underscored that the adoption of new technologies in language education introduces novel privacy challenges. Interaction among students in these settings may be susceptible to exploitation, thereby underscoring the necessity of fostering trust through effective data management strategies. Kamenskih (2022) further cautions that incidents of personal hacking and data breaches must be minimised in immersive educational environments.

Teachers also face privacy concerns in immersive environments, as they frequently have access to sensitive student data, such as feedback and performance analytics. To maintain ethical standards, teachers need to handle this information judiciously, ensuring that it remains confidential and is not subject to unauthorised access or improper utilisation. Moreover, the challenges associated with the adoption of information technology into innovative educational virtual environments often place accountability not on the developers but rather on government oversight, particularly through accreditation and certification processes (Kamenskih, 2022). Consequently, educators should only access data pertinent to their teaching roles within the institution to avert potential privacy infringements. Canto et al. (2013) explored the complexities inherent in utilising platforms such as SL in language education, asserting that the establishment of clear privacy guidelines and the implementation of secure tools are vital for the management of sensitive information pertinent to both students and educators.

Rani (2022) elucidated that AI-powered chatbots utilised in language education collect data from student interactions, which raises significant concerns regarding data sharing and the potential for misuse. To ensure transparency in data collection and analysis, it is imperative that stringent privacy protocols be implemented. Additionally, ethical guidelines are essential to safeguard student privacy while simultaneously reaping the benefits of the personalised feedback and support these tools can provide. When adequately secured, AI tools have the potential to transform language education by offering grammar checks, writing assistance, and adaptive learning experiences. Moreover, the incorporation of Metaverse and SL technologies introduces cultural and social concerns. Although these platforms present numerous advantages for language education, they can also foster negative behaviours such as harassment, bullying, or cultural misunderstandings. To cultivate respectful and inclusive environments, educators are required to adopt culturally responsive teaching practices and undergo training in cultural dynamics (Hunter, 2015). Virtual classrooms should integrate diverse cultural perspectives, community guidelines, and moderation tools to preserve a safe and inclusive learning atmosphere. When properly managed, these intelligent technologies can bridge cultural divides and foster global understanding.

Another significant challenge pertains to communication issues and the apprehension surrounding negative criticism. Delayed feedback or harsh evaluations can adversely affect student motivation and participation. Nevertheless, immersive tools such as the Metaverse, SL, and AI can deliver real-time, supportive feedback, thereby alleviating anxiety and enhancing engagement. Canals (2020) emphasised the need to address the technical, ethical, and user adaptation challenges within virtual classrooms. Similarly, Garcia and da Silva (2018) recognise the benefits of SL and avatars while also acknowledging concerns related to negative feedback.

In conclusion, while immersive technologies present immense potential for language education, their effective utilisation in higher education necessitates meticulous attention to privacy, ethical responsibilities, and inclusive design.

Q3: What are the future directions of Metaverse, SL and AI environments for learning and teaching second languages in higher education?

Future developments will likely focus on building Metaverse replicas of educational institutions to enhance flexibility, accessibility, and engagement in education. Sami et al. (2023) explored how digital replicas of schools and universities within the Metaverse can break geographical and logistical barriers to language learning. These technologies allow students to engage in real-time discussions and collaborate using a wide range of immersive tools and resources. The immersive learning environment provides realistic simulations, making language learning more effective and contextual. Visual aids, multimedia elements, and interactive virtual experiences can enhance the understanding of complex grammar and language structure. Virtual simulations also benefit educators by saving time and effort, which enables them to

manage their classes efficiently while delivering realistic and meaningful instruction. These environments are particularly beneficial for remote learners who are unable to attend in-person sessions.

The adoption of innovative technologies, like lifelogging applications integrated with AI, IoT, and blockchain, offers a personalised and data-driven approach to language education. Tlili et al. (2022) emphasised that these technologies can track learner progress, generate actionable learning insights, and ultimately improve student outcomes. However, further research is needed to explore how immersive technologies can more effectively support learners with disabilities by developing inclusive and accessible virtual environments.

To facilitate the successful adoption of these immersive tools into teaching practices, both synchronous and asynchronous training sessions should be provided for educators. Promoting collaboration in virtual settings can also foster student engagement and teamwork, which are essential for completing projects and tasks in real-time. This builds a sense of community and increases the likelihood of successful smart technology adoption.

Conclusion

The Metaverse, AI, and SL environments represent a significant frontier in the evolution of language education, which offers unprecedented opportunities to adopt digital and physical realms within multiuser immersive settings. This systematic review aims to highlight both benefits and challenges and provide solutions to educational obstacles, while also outlining future directions for their adoption in language higher education contexts. The synthesis of 130 studies demonstrates that the use of Metaverse, AI, and SL technologies in language education is reshaping the accessibility and availability of teaching and learning resources, thereby transforming pedagogical practices. The findings show that the benefits of using Metaverse, AI, and SL technologies include overcoming traditional limitations of language instruction, enhancing learner awareness and language acquisition, increasing motivation and engagement, supporting fluency development, and encouraging active participation. Furthermore, these immersive technologies have been shown to enhance teaching strategies and establish ethical frameworks that support both educators and learners. However, several barriers hinder the use of these technologies, including technical constraints, limited expertise in developing and utilising immersive 3D platforms, and challenges in managing virtual classrooms which collectively limit their overall potential. In addition, insufficient training prevents students from fully realising the benefits of these innovative tools for second language acquisition. Despite these obstacles, the findings underscore the significant promise of immersive technologies in advancing language education. By addressing the identified challenges through targeted training, institutional support, and robust implementation strategies, educators, policymakers, and researchers can maximise the transformative potential of the Metaverse, AI, and SL environments. Ultimately, this review provides critical insights to guide researchers, academics and institutions in navigating the dynamic landscape of digital language education and harnessing immersive technologies for effective, equitable, and innovative learning and teaching experiences. One limitation of this study is that the information and analysis are limited to existing literature focused solely on the Metaverse, AI, and SL environments. Additionally, the scope of the research is restricted to higher education contexts. Future studies should explore the application of alternative technologies across other educational levels, such as primary and secondary education, to broaden the understanding of their potential impact.

Practical implications

From a practical perspective, the systematic review has examined the benefits and challenges of Metaverse, SL, and AI technologies in the realm of language learning and teaching. This paper outlines an avenue for conducting further research that may lead to the development of teaching procedures and learning experiences by implementing these new technologies. This systematic review provided insights into the challenges of implementing Metaverse, SL, and AI technologies for learning and teaching new languages. Before adopting the Metaverse, SL, and AI technologies, it is essential to address the technical issues that arise when using Metaverse software during the learning process and make them more affordable and accessible for users to leverage the benefits of these immersive technologies. Secondly, this paper highlighted the essential role of the Metaverse, SL, and AI technologies in addressing traditional learning and ethical challenges. The study described continuous learning opportunities that were not limited by time or space. With AI tutors, the Metaverse technology provides students with direct feedback, immediate assistance, and prompts to enhance training and learning efficiency. The results can be utilised by education providers, policymakers, language academics, and teachers to develop effective mechanisms, such as needs assessment frameworks, digital readiness evaluations, and pedagogical integration models, for understanding the challenges of using new virtual technologies. They can also inform practical strategies, such as targeted professional development programs, the incorporation of immersive tools into language curricula, and the design of adaptive, learner-centred virtual environments to enhance future teaching and learning experiences.

Recommendations

The following recommendations are suggested based on the findings of this study. First, it is important for higher education providers to provide a comprehensive training for language academics in using Metaverse, AI, and virtual environments effectively. Second, higher education providers need to ensure reliable internet connectivity and hardware are readily available for both academics and learners for immersive environments like Second Life and Metaverse platforms. Third, academics should collect student feedback regularly to evaluate effectiveness and improve implementation of the immersive technologies. Fourth, higher education providers must ensure that platforms

comply with institutional and legal data protection policies, especially regarding privacy and data concerns. Fifth, these providers should also focus on accessibility and equity for ensuring that all students have the resources and support to participate fully.

Future research opportunities

Future studies could focus on practical concerns, like privacy, self-sufficiency, technology-related anxiety, user satisfaction, security, and broader ethical considerations. When using immersive technologies, it is vital to address ethical dilemmas, particularly those related to privacy, data security and fairness, to create a safe and supportive immersive education environment. Future research should build on the findings of this review, particularly the identified benefits and challenges of immersive and AI-driven technologies, by employing more standardised reporting practices and exploring underexplored areas, especially accessibility for learners with disabilities to ensure that immersive and AI-mediated environments promote inclusivity and equitable participation. This study has highlighted various challenges associated with the implementation of Metaverse, SL, and AI technologies in new language education, indicating critical domains for future inquiry. Further investigation is essential to understand the most effective strategies for training educators and students to collaborate within immersive environments. Additionally, research should explore the design and evaluation of Metaverse-based applications that improve accessibility, affordability, and user-friendliness in higher education. Moreover, there is a necessity to examine the long-term pedagogical impacts of these technologies on language acquisition and learner engagement.

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Culturally relevant assessment and generative AI: A co-creation framework for pre-service teachers

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Abstract

Despite the ubiquitous use of generative artificial intelligence (GenAI) in education, there is an urgent need to explore its potential to co-create culturally relevant assessment material for learners. This study aims to fill this void by exploring how GenAI can be used to co-create material that is sensitive to learners from diverse cultural backgrounds while being cognisant of inclusivity and equitable assessment opportunities. Through a synthesis of literature, the culturally relevant pedagogy framework, and assessment materials co-created by GenAI, the study seeks to empower pre-service teachers, practitioners, teacher-educators in higher education institutions and policymakers to integrate GenAI-driven assessment in their teaching. The key findings indicate a positive correlation between GenAI integration and enhanced cultural relevance in assessment materials co-creation. This innovative, pedagogical curriculum design case contributes to the discourse on GenAI in culturally relevant assessment practices and advocates for a paradigm shift that emphasises cultural responsiveness and inclusivity.

Introduction

The capabilities of generative artificial intelligence (GenAI) have grown steadily over the years and has made significant contributions in all fields. However, in the last two years, we have witnessed an increased growth of GenAI models with the potential to re-imagine pre-service teacher (PST) education and training. GenAI may have the potential to provide PSTs with the opportunity to co-create learning materials for assessment. This may encourage PSTs to design assessments that are culturally sensitive and relevant for their learners. The current literature on assessment and GenAI focuses on personalised learning (Bayly-Castaneda et al., 2004; Bozkurt & Sharma, 2023), feedback (Kasneci et al., 2023), and ethical considerations (Naidu & Sevnarayan, 2023; Popenici, 2023; Popenici et al., 2023), while it neglects the pertinent cultural dimension. Although existing research explores GenAI's role in personalised learning (Bayly-Castaneda et al., 2024) and flags critical ethical risks like linguistic bias against non-native speakers (Liang et al., 2023) and threats to assessment integrity (Naidu & Sevnarayan, 2023), we have not found studies that have strategically utilised Meta AI, a uniquely open, multimodal, and globally scalable large language model (LLM), as a co-creative partner to design culturally relevant assessments. Unlike proprietary models trained on homogenised, Western-centric corpora (Fatih Tofiq, 2025), Meta AI's open-source architecture invites interrogation and localisation which enable teachers to audit, adapt, and retrain outputs to reflect the epistemic diversity of their learners (Pratschke, 2024). Its multimodal capacity, which generates not only text but culturally resonant imagery, dialogue, and scenarios, allows for assessments that engage multiple literacies and lived experiences, to move beyond just inclusion toward authentic representation. This positions our work not merely as an application of existing AI tools, but as a critical redesign of the human-AI collaboration model itself; one that centres cultural relevance, and teacher agency in the algorithmic age. Significantly, while studies acknowledge the risk of cultural bias in GenAI (Liang et al., 2023; Naidu & Sevnarayan, 2023), they stop short of providing actionable, pedagogically grounded strategies to dismantle it. This study confronts this gap through a novel, prompt-engineered framework that actively aligns Meta AI's generative capacity with Ladson-Billings' culturally relevant pedagogy (CRP) and transforms it from a potential of bias into a deliberate tool for epistemic justice.

We explore the intersection of GenAI, specifically Meta AI, and CRP to provide English PSTs with an alternative approach of how to design their own assessment materials that are relevant to their learners. Khunou (2020) argues that culturally responsive teaching is imperative for classrooms, given the diversity in language and socio-cultural backgrounds among students. Yet, many teacher training programs still lack pedagogy that prepare PSTs to develop culturally responsive teaching. When English PSTs do not design their own teaching and learning materials, their pedagogical practice is often constrained because they are unable to respond to learner diversity. In the South African context, many PSTs rely heavily on textbooks and teacher's guides (Jita, 2018). While these resources may provide a framework, they often limit opportunities for contextualisation and do not adequately reflect the linguistic, cultural and socio-economic realities of diverse classrooms (Ball & Cohen, 1996). This gap may result in PSTs feeling unprepared for the demands of culturally responsive teaching environments. Hence, the research question that guides this study is: Can GenAI be used to assist English PSTs to co-create assessment materials that are culturally relevant to diverse learners? In answering this question, this article seeks to contribute to the discourse on GenAI as a co-creator of assessment materials that are culturally relevant and inclusive of learners from diverse cultural, linguistic and ethnic backgrounds. We provide an innovative, GenAI-mediated approach to actively counter cultural bias in assessment, which is a persistent issue wherein standardised tools often marginalise non-dominant cultural and linguistic identities (Baidoo-Anu et al., 2023; Ladson-Billings, 1995). This article moves beyond surface-level inclusion toward epistemic justice and equitable representation in assessment practices through empowering PSTs to co-create context-specific, culturally relevant assessments.

Literature review

The need for culturally relevant pedagogy in teacher education

CRP has increasingly become important and necessary to address the needs of diverse learners in the classroom particularly in societies marked by demographic diversity and educational inequities (Ladson-Billings, 1995). CRP acknowledges the use of learners' cultural knowledge, experiences, and background to make learning relevant, meaningful and empowering (Apple, 2004; Gay, 2002, 2018). According to Gay (2018, p.10), "Culture, like any other social or biological organism, is multidimensional and continually changing. It must be so to remain vital and functional for those who create it and for those it serves". Research shows that when teachers integrate learners' cultural backgrounds and experiences into their teaching and assessment, they create a more engaging environment that promotes greater academic achievement and a sense of belonging (Gay, 2002, 2018; Ladson-Billings, 1995; Paris, 2021).

The consequences of neglecting culturally responsive teaching are significant. Research consistently demonstrates that when learners' cultural backgrounds are ignored, classrooms risk alienating them, by reducing motivation, and reinforcing systemic inequities (Nieto, 2010; Sleeter, 2012). Learners from marginalised backgrounds often experience schooling as assimilationist, where their cultural identities are devalued or rendered invisible (Delpit, 2006). This not only undermines academic achievement but also erodes learners' sense of belonging (Ladson-Billings, 2009). Without CRP, schools perpetuate deficit perspectives that frame culturally diverse learners as 'problems to be fixed' rather than as holders of valuable knowledge systems (Valenzuela, 1999).

The challenge for PSTs is acquiring the skill of designing and implementing culturally relevant assessments. Most PST education training prog rams do not adequately prepare PSTs with these skills, which leaves them underprepared to meet the demands of their diverse classrooms (Khunou,

2020). One may argue that if PSTs lack foundational training in culturally relevant pedagogy, their evaluation of AI-generated content risks reproducing the very biases the approach seeks to dismantle. However, rather than disqualifying PSTs from the process, this gap positions the co-creation task as a scaffolded, experiential learning opportunity; one that compels PSTs to confront, interrogate, and develop cultural competence through guided critical engagement with AI outputs. As Naidu and Sevnarayan (2023) caution, uncritical adoption of AI tools can perpetuate harm; thus, this process must be embedded within structured mentorship, explicit CRP frameworks, and reflective dialogue to transform evaluation from a subjective guess into a deliberate, educative act of cultural discernment. Traditional assessment materials that are modelled on standardised testing do not adequately capture learners' knowledge and abilities from minority cultural and linguistic groups (Apple, 2004; Gay, 2018; Ladson-Billings, 1995, 2009). Thus, there is an urgent need for adaptable assessment materials that can address the diversity of the modern classroom. CRP is not only a moral imperative, but also a pedagogical necessity for promoting equity and inclusivity in the classroom.

GenAI in education

In education, GenAI has become a catalyst for new ways of thinking about designing assessments, which makes them helpful for writing, creating content, and solving problems (Naidu & Sevnarayan, 2023). GenAI could help teachers with lesson planning, producing educational resources, and even tailoring material to specific contexts and learners (Baidoo-Anu & Ansah, 2023; van den Berg & du Plessis, 2023). Hence, the LLMs of GenAI, such as, ChatGPT, Meta AI, and Copilot provide a solution (Baidoo-Anu & Ansah, 2023) for PSTs wanting to design culturally relevant assessments that cater for learners from diverse linguistic and ethnic backgrounds. PSTs can use the LLMs to co-create assessments that are culturally sensitive and relevant for their learners. In this way, LLMs can empower PSTs to become skilled and effective materials developers who are able to meet the needs of their learners while ensuring inclusive and equitable assessment opportunities

Challenges and opportunities for co-creating with GenAI

Although GenAI has enormous educational potential (Baidoo-Anu & Ansah, 2023), there are also serious concerns over its efficacy and moral use in a variety of learning contexts. For example, Popenici (2023, p. 381) argues that "The blind trust in and adoption of new tech by educators... becomes even more dangerous in the era of AI" because of the possibility of perpetuating the cultural biases in the data used to train AI models. If the content generated by GenAI is not carefully managed, it could inadvertently perpetuate stereotypes or exclude certain cultural perspectives and thus undermine efforts to create culturally relevant assessments. Furthermore, GenAI systems may be trained on materials that prioritise standard English language varieties and potentially disadvantage learners who speak non-standard varieties of English (Liang et al., 2003). To avoid this, it is important for English PSTs to be actively involved in the co-creation process when using GenAI. It must be argued that "[t]he challenge ahead for education is to become users of AI for the benefit of our students and institutions rather than simple subjects of AI" (Popenici, 2023, p. 381). Instead of relying solely on GenAI to generate content, teachers should use it as a collaborative tool that allows them to input their knowledge of their learners' cultural backgrounds and experiences. This co-creation approach ensures that the materials produced by GenAI are both authentic and aligned with the principles of CRP. It may also provide an opportunity for PSTs to critically engage with GenAI and develop an understanding of how to use it effectively in their practices. Co-creating assessment materials with GenAI may free up time for teachers and allow them to spend more time teaching their learners (van den Berg & du Plessis, 2023).

Pedagogical framework

CRP, as conceptualised by Ladson-Billings (1995, 2009), was used as a pedagogical framework for this study. CRP is best known as a framework in education that addresses the academic and social needs of learners from diverse cultural backgrounds. CRP has been adapted and extended by other scholars. Gay (2018) refers to CRP as 'culturally responsive teaching' and Paris (2021) as 'culturally sustaining pedagogy'. Despite the differences in terminology, these approaches are not in conflict with each other; their goal is to educate learners by focusing on the strengths that they bring into the classroom. Ladson-Billings (1995, 2009) theorised pedagogy within a critical paradigm and proposed three principles to be considered CRP:

- Produce learners who can achieve academically
- Produce learners who demonstrate cultural competence
- Develop learners who can both understand and critique the existing social order.

For these principles to be realised, Ladson-Billings also proposed teaching behaviours that PSTs, in the context of this study, need to embody to merit the designation 'culturally relevant'. These include:

1. The conceptions of self and others: Ladson-Billings observed that exemplary teachers of CRP held a belief that their learners were capable of academic success, and these teachers saw themselves as members of the community and teaching as a way of giving back to the community. In these classrooms, learners were "cajoled, nagged, pestered, and bribed to work at high intellectual levels" (1995, p.479). This culturally relevant behaviour of teachers is emphasised by Gay (2002, p. 110), "when teachers believe in their learners' intellectual potential without ignoring or neglecting their ethnic and cultural identities, they build towards academic success from a basis of cultural validation and strength".

2. The structure of social relations: Culturally relevant teachers maintained fluid learner-teacher relationships and demonstrated a connectedness with all their learners. They also encouraged their learners to work collaboratively and be responsible for one another. In these classrooms, the learner-teacher relationships were "equitable and reciprocal" (Ladson-Billings, 1995, p. 480).

3. The conceptions of knowledge: Culturally relevant teachers held the view that "knowledge is not static, it is shared, recycled, and constructed" (Ladson-Billings, 1995, p. 481). Hence, in these classrooms, learners listened and learnt from each other and the teacher. By doing so, learners' knowledge was affirmed. Gay (2018, p. 17) argues that "Culturally responsive teaching recognizes and further develops this natural diversity and fluidity of competence among diverse student populations".

Ladson-Billings' (1995, 2009) conception of knowledge aligns with Brookfield's (2017) critical reflection and Apple's (2004) critical theory, which both emphasise a democratic, participatory model of education where learners engage in knowledge-making and learn to question and transform their realities. Brookfield (2017, p. 26) advocated for teachers to see things differently and to be "interested in how power manifests itself in the classroom, how it moves around an educational setting, when its exercise opens up new possibilities, and when it closes them down". Similarly, Apple (2004) emphasises the influence of social structures on education and argues for the recognition of knowledge as socially constructed, urging teachers to address how dominant ideologies shape curricula and marginalise diverse voices. When integrated into CRP, these theories encourage teachers to design materials that enable learners to understand and critique social orders, aligning with Ladson-Billings' (1995) goal of developing learners capable of socio-political critique.

CRP has laid the foundation for the importance of teachers including "student culture in the classroom as authorized or official knowledge" (Ladson-Billings, 1995, p. 483). Gay (2018) also supports the use of learners' culture and experiences in the classroom to expand their intellectual and academic achievement and refers to this process as 'cultural scaffolding'.

Inspired by Ladson-Billings' (1995), Gay's (2018) and Paris's (2021) philosophy of CRP, we look at ways of how PSTs can use GenAI to co-create culturally relevant assessment materials. Like Gay (2018, p. 53), we believe that "If the potential of culturally responsive pedagogy is to be realized, then widespread instructional reform is needed, as well as major changes in the professional development, accountability, and assessment of teaching personnel".

Methodology

Context

This study utilises a hybrid learning environment which combines the digital collaboration of Meta AI and English PSTs in the co-creation of culturally relevant assessment materials. Meta AI (powered by Llama 4, as of 2025) is a publicly accessible, web-based conversational AI developed by Meta Platforms, Inc. It operates via natural language processing to generate text, answer questions, and create content based on user prompts. While the exact architecture and training data are proprietary, Meta AI is known to be trained on publicly available internet text and is designed to be instruction-tuned for educational and creative tasks. For this study, we used the free, publicly available version accessible via Meta AI at the time of data collection. Meta AI is the learning context that is used to assist PSTs to create authentic materials that may be used to encourage creativity, critical thinking, and collaboration among learners. This study was conducted with English PSTs in mind. We used South Africa as a teaching context to explore how PSTs can co-create culturally relevant assessments with GenAI; however, this study can be generalised to any cultural context. The resource we used was a computer with access to the Internet to utilise GenAI platforms. This resource enabled the researchers to have an effortless interaction with Meta AI. We explored the potential of Meta AI to generate culturally relevant assessments that are aligned to the South African context. South Africa's diverse population of learners in school provided a unique backdrop to explore culturally relevant teaching and assessment materials. We used Meta AI to ensure that the generated assessment materials would resonate with PSTs and their learners.

Prompt-based pedagogical format

This study employs a prompt-based pedagogical format using the free version of Meta AI to co-create culturally relevant materials for English PSTs using South Africa as a context. The format consists of the following stages which PSTs can use to design their culturally relevant assessment materials:

Stage one - Prompt development

The researchers planned and created a set of carefully designed prompts that reflect South African cultural contexts, diverse learner needs, and English language teaching objectives. These prompts were designed by the researchers and drew on their prior knowledge and experience of designing prompts together with the curriculum requirements for Grade 8 English Home Language South African learners as set out in the Curriculum and Assessment Policy Statement (CAPS) (DoBE, 2011).

Stage two - Text generation

The researchers then inputted their developed prompts into Meta AI. Meta AI was not used to co-create any of the prompts. Meta AI then generated culturally relevant materials and/or images.

Stage three - Text evaluation and refinement

We have implemented a structured, multi-layered evaluation protocol to address concerns regarding evaluator bias and a lack of preparation in culturally relevant assessment design. Evaluator criteria.

All evaluators (the researchers in this pilot phase) are qualified English education specialists with at least ten years' experience teaching in South African public schools and familiarity with CAPS. Their cultural competence was further validated through prior involvement in curriculum development projects focused on multilingual and multicultural classrooms.

Evaluator training

Both evaluators hold qualifications in pedagogy and teacher development practice, and participated in trainings such as workshops, seminars, and conferences which focused on assessment design and artificial intelligence, respectively. Triangulation strategy.

We used methodological triangulation to enhance validity and reliability. The researchers evaluated the generated materials from Meta AI using the CAPS which guides teaching and learning in South Africa. The CAPS recommends the length of texts to be read and written. It also recommends the types of questions that should be asked of learners and the weighting of lower and higher order questions. The researchers then read through the generated materials to assess if learners in South African school contexts would find the materials meaningful, culturally relevant, accurate, and suitable for classroom use. A culturally relevant rubric was created to assess representations of local identities, languages, values, and lived experiences. After independent evaluations, the researchers engaged in consensus discussions to resolve discrepancies and document justifications for final ratings. Although not implemented in this pilot, future iterations will involve PSTs and learners in validating cultural relevance, a step explicitly noted as Stage 5 in our design. All evaluation data (comments and revisions) were documented in a shared digital log to ensure auditability and traceability of decision-making. The next two stages are not implemented in this study but should be implemented by PSTs in school contexts.

Stage four - Integration and application

The final co-created materials may then be used as culturally relevant assessments.

Stage five - Reflection and dissemination

The final stage should involve PSTs reflecting on the co-creation process. They should evaluate the effectiveness of the generated materials by seeking feedback from their learners. In future scaled implementations, this stage will include learner focus groups and PST reflective journals to further triangulate findings and enhance validity.

Prompt generation

To illustrate the prompt-based approach, we inputted the following prompts into Meta AI:

Prompt one

"I am an 8th Grade teacher. The topic that we are focusing on in class is 'Being a new learner in high school'. Create a text for Grade 8 (aged 14) South African learners of about 250 words. The text must be written as a story with detailed characterisation and a strong theme of 'being a new learner in high school'. The story must be culturally relevant and appeal to teenagers in the South African context."

Prompt two

"Generate critical, engaging and culturally relevant questions of between 1, 2, 3 and 4 marks totalling 15 marks. Create 7 questions that must be related to the story and must probe learners' thinking. Include the different levels of Bloom's taxonomy in the questioning. Create suggested answers that are culturally sensitive for the questions to assist the teacher to assess this task."

Prompt three

"Design a writing task based on the story. The task must be culturally relevant and require learners to reflect on their own experiences of being a new Grade 8 learner in high school. This should total 20 marks. Include a culturally sensitive rubric in table format to assist the teacher to assess this task."

Prompt four

"Create a culturally relevant oral activity using the panel discussion format for learners about 'being a new learner at high school'. The interviewer must prompt learners to discuss who they are, where they come from, and how they feel about being a new learner in high school. Tabulate a culturally sensitive rubric to assess this activity out of 15 marks."

Findings

The researchers have selected a South African Grade 8 classroom context to generate assessment materials and questions. We thought of a topic that most Grade 8 learners encounter when starting high school, 'being a new learner in school', and have used Meta AI to assist us to create a culturally relevant story for an English classroom. Figure 1 shows the first prompt which was created to accommodate a diverse group of Grade 8 learners transitioning to a high school.

Prompt one:

I am an 8th Grade teacher. The topic that we are focusing on in class is 'Being a new learner in high school'. Create a text for grade 8 (aged 14) South African learners of about 250 words. The text must be written as a story with detailed characterisation and a strong theme of 'being a new learner in high school'. The story must be culturally relevant and appeal to teenagers in the South African context.

Navigating the Unfamiliar Halls of High School

As the sun rises over the vibrant streets of Soweto, 14-year-old Amogelang prepares for her first day at Meadowlands High School. She feels a mix of excitement and nerves, having left behind the familiarity of her primary school. Clutching her new school bag, adorned with colorful badges and African prints, Amogelang takes a deep breath.

Upon arrival, she's greeted by the school's lively atmosphere. The sound of laughter, chatter and Afro-pop music fills the air. Amogelang spots learners wearing various cultural attire - traditional Sotho, Zulu and Xhosa clothing - proudly showcasing their heritage.

In her classroom, Amogelang meets her classmates: Thembi, an avid soccer player; Ntombi, a talented singer; and Tumelo, a tech-whiz. Together, they navigate the challenges of high school. They bond over shared experiences, supporting each other through academic pressures, sports competitions and cultural events.

Amogelang discovers hidden strengths and talents. She joins the debate team, finding her voice on social issues affecting South African youth. Her classmates encourage her to embrace her uniqueness.

As the days turn into weeks, Amogelang transforms from a timid newcomer to a confident, engaged learner. She realizes high school isn't just about academics; it's about growth, friendship and self-discovery.

"Being new doesn't mean being alone," Amogelang's teacher, Mrs. Mthembu, reminds them. "Embrace your individuality, celebrate diversity and build strong relationships. You are the future leaders of South Africa."

Amogelang and her friends leave school, inspired to tackle challenges, explore opportunities and forge their paths.

Would you like me to make any adjustments or provide additional resources?

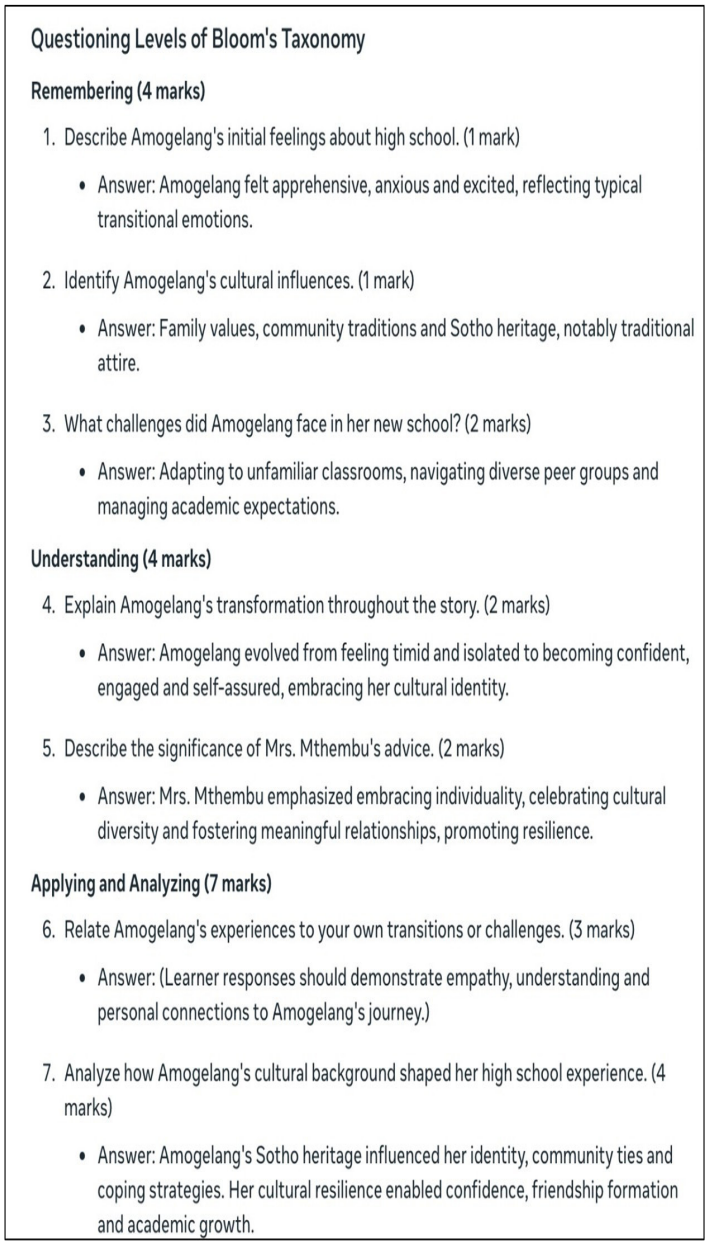
Figure 1. The use of Meta AI to generate culturally relevant stories.

The story generated by Meta AI reflects key socio-cultural markers of the South African adolescent experience, such as being a new learner in high school, geographic references (Soweto), cultural practices (Afro-pop music), and age-appropriate themes (academic pressures, sport competitions and cultural events). Meta AI was able to localise references authentically, Soweto's vibrant streets, traditional clothing and Afro-pop music. While this suggests potential for resonance, actual learner reception remains to be empirically validated through classroom implementation and feedback, as recommended in Stage 5 of the framework. We thought it appropriate that this generated story referenced 'Meadowlands high school' an iconic site where the Soweto Uprisings took place on June 16, 1976. Moreover, the story in Figure 1 captures everyday struggles, interests, and strengths of South African teenagers; and thus, may encourage empathy and a sense of connection among learners in the classroom. Meta AI's adaptability ensured age-appropriate language, tone and complexity for 14-year-olds, thereby optimising engagement. We appreciated how Meta AI's inclusive approach celebrates individuality, unity and self-discovery by addressing socio-cultural challenges in the South African context. PSTs may replicate this approach and generate personalised materials that reflect the diversity of South African learners. Interestingly, in Figure 1, we noticed that learners using cultural attire to school is not a South African everyday school uniform. This information is incorrect in this context and would require PSTs to have a critical eye when generating such content. They may need to edit such information to suit the needs and experiences of the learners they teach. Alternatively, PSTs can re-design their prompt by providing Meta AI with greater detail to achieve an output that is more consistent in the given context.

In the second prompt, we requested Meta AI to generate culturally relevant questions in response to the story it created for us. We were specific about what we wanted Meta AI to do. We requested it to include a certain number of questions, the weighting of questions according to Bloom's taxonomy and the total marks. In the same prompt, we requested Meta AI to create suggested answers that may assist PSTs to assess learners' written responses. Figure 2 illustrates how Meta AI can be used to assist teachers to design culturally relevant questions for learners.

Prompt two:

Generate critical, engaging and culturally relevant questions of between 1, 2, 3 and 4 marks totalling 15 marks. Create 7 questions that must be related to the story and must probe learners' thinking. Include the different levels of Bloom's taxonomy in the questioning. Create suggested answers that are culturally sensitive for the questions to assist the teacher to assess this task.



Questioning Levels of Bloom's Taxonomy

Remembering (4 marks)

1. Describe Amogelang's initial feelings about high school. (1 mark)
   - Answer: Amogelang felt apprehensive, anxious and excited, reflecting typical transitional emotions.
2. Identify Amogelang's cultural influences. (1 mark)
   - Answer: Family values, community traditions and Sotho heritage, notably traditional attire.
3. What challenges did Amogelang face in her new school? (2 marks)
   - Answer: Adapting to unfamiliar classrooms, navigating diverse peer groups and managing academic expectations.

Understanding (4 marks)

4. Explain Amogelang's transformation throughout the story. (2 marks)
   - Answer: Amogelang evolved from feeling timid and isolated to becoming confident, engaged and self-assured, embracing her cultural identity.
5. Describe the significance of Mrs. Mthembu's advice. (2 marks)
   - Answer: Mrs. Mthembu emphasized embracing individuality, celebrating cultural diversity and fostering meaningful relationships, promoting resilience.

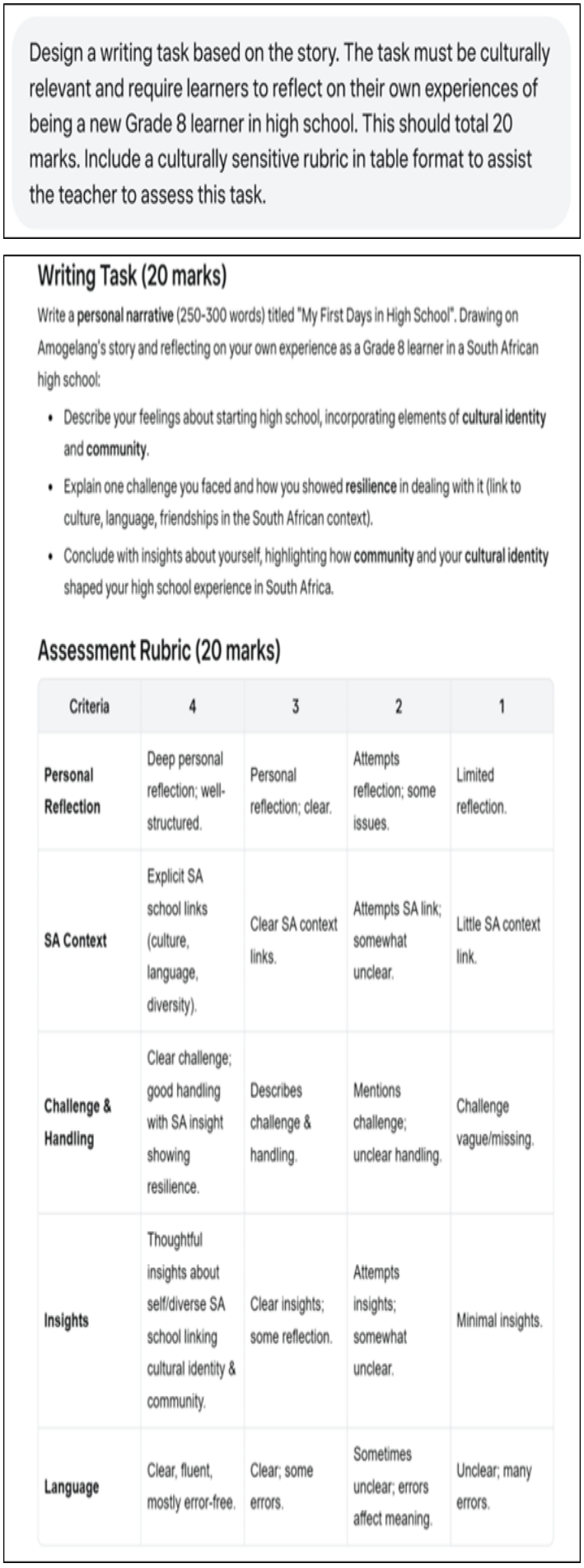
Applying and Analyzing (7 marks)

6. Relate Amogelang's experiences to your own transitions or challenges. (3 marks)
   - Answer: (Learner responses should demonstrate empathy, understanding and personal connections to Amogelang's journey.)
7. Analyze how Amogelang's cultural background shaped her high school experience. (4 marks)
   - Answer: Amogelang's Sotho heritage influenced her identity, community ties and coping strategies. Her cultural resilience enabled confidence, friendship formation and academic growth.

Figure 2. The use of Meta AI to create culturally relevant questions and suggested answers.

Figure 2 shows how Meta AI can create culturally relevant assessments that align with Bloom's taxonomy ranging from basic recall questions to questions that demand creative thinking and application. Meta AI is also able to generate suggested answers to the questions it creates. However, PSTs would need to adopt a critical stance when evaluating the suggested answers generated by GenAI. For example, from our assessment of the suggested answers in Figure 2, we have observed that the responses to Question Five do not respond to the complexity of the question. PSTs should engage with the suggested answers to ensure that they meet the level and expectations of the marking criteria. Despite this drawback, we are of the opinion that PSTs would find this tool quite handy as it would save them time, encourage creativity in designing materials for classroom use and create a space to engage with their learners' cultural backgrounds. Figures 1 and 2 show how Meta AI can create a reading task for learners with questions and answers. We then thought that we should explore the idea of creating a writing task for learners, as shown in Figure 3.

Prompt three:



Design a writing task based on the story. The task must be culturally relevant and require learners to reflect on their own experiences of being a new Grade 8 learner in high school. This should total 20 marks. Include a culturally sensitive rubric in table format to assist the teacher to assess this task.

Writing Task (20 marks)

Write a **personal narrative** (250-300 words) titled "My First Days in High School". Drawing on Amogelang's story and reflecting on your own experience as a Grade 8 learner in a South African high school:

- Describe your feelings about starting high school, incorporating elements of **cultural identity** and **community**.
- Explain one challenge you faced and how you showed **resilience** in dealing with it (link to culture, language, friendships in the South African context).
- Conclude with insights about yourself, highlighting how **community** and your **cultural identity** shaped your high school experience in South Africa.

Assessment Rubric (20 marks)

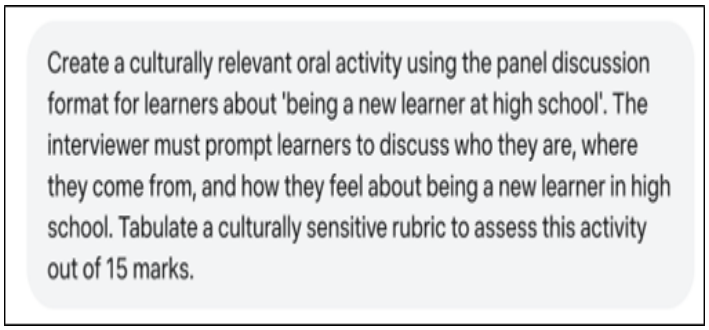
Criteria	4	3	2	1
Personal Reflection	Deep personal reflection; well-structured.	Personal reflection; clear.	Attempts reflection; some issues.	Limited reflection.
SA Context	Explicit SA school links (culture, language, diversity).	Clear SA context links.	Attempts SA link; somewhat unclear.	Little SA context link.
Challenge & Handling	Clear challenge; good handling with SA insight showing resilience.	Describes challenge & handling.	Mentions challenge; unclear handling.	Challenge vague/missing.
Insights	Thoughtful insights about self/diverse SA school linking cultural identity & community.	Clear insights; some reflection.	Attempts insights; somewhat unclear.	Minimal insights.
Language	Clear, fluent, mostly error-free.	Clear; some errors.	Sometimes unclear; errors affect meaning.	Unclear; many errors.

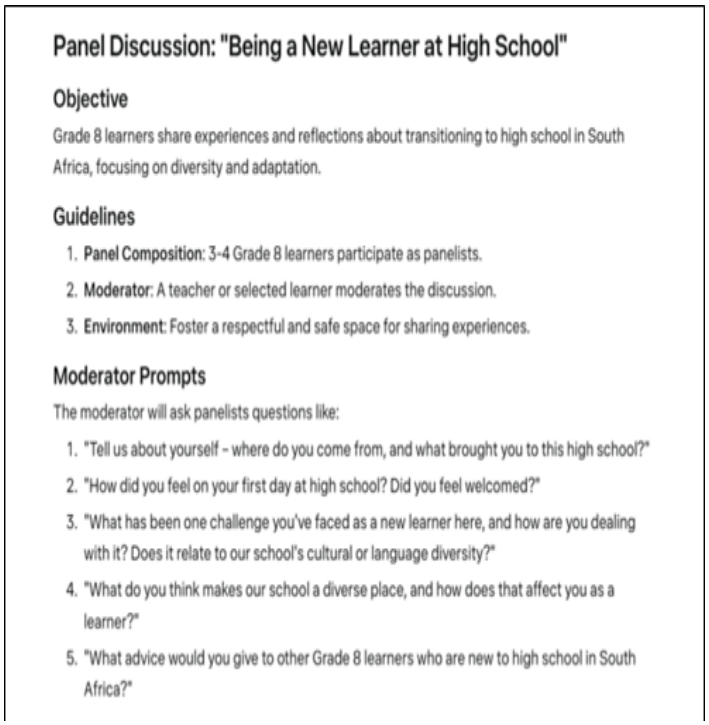
Figure 3. The use of Meta AI to create writing tasks.

We found Meta AI to be quite impressive as it remembered the original text it created and set a variety of task requirements from the prompts inputted. In Figure 3, Meta AI drew on Amogelang's story and instructed learners to write a similar narrative to mirror their experiences. Meta AI can create specific instructions to learners to enable them to complete all the requirements of the task such as describing their initial anxieties and excitement about high school, drawing on their experiences in primary school, discussing their strengths and challenges, reflecting on new relationships formed and concluding with lessons learned. In addition, Meta AI was able to tabulate a culturally sensitive rubric to assess this writing task. The rubric responds to the initial prompt we inputted where we requested Meta AI to enable this task to be assessed out of 20 marks.

In our final prompt, we requested Meta AI to create a speaking activity for Grade 8 learners. The activity we prompted Meta AI to create was a panel discussion that would enable them to reflect on their transition to high school.

Prompt four:





Panel Discussion: "Being a New Learner at High School"

Objective

Grade 8 learners share experiences and reflections about transitioning to high school in South Africa, focusing on diversity and adaptation.

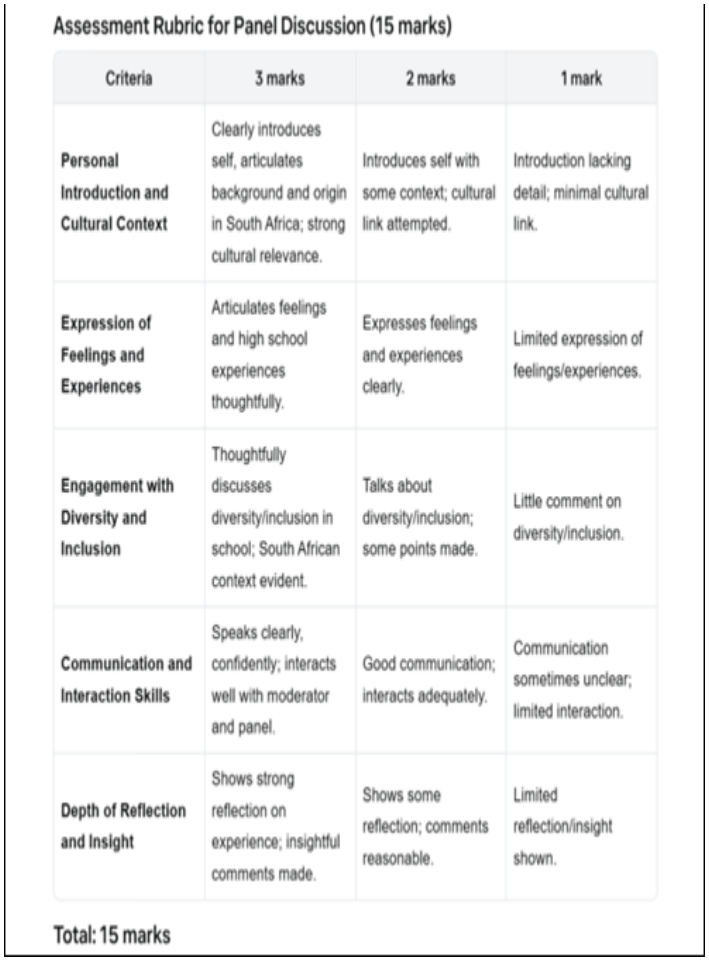
Guidelines

1. **Panel Composition:** 3-4 Grade 8 learners participate as panelists.
2. **Moderator:** A teacher or selected learner moderates the discussion.
3. **Environment:** Foster a respectful and safe space for sharing experiences.

Moderator Prompts

The moderator will ask panelists questions like:

1. "Tell us about yourself - where do you come from, and what brought you to this high school?"
2. "How did you feel on your first day at high school? Did you feel welcomed?"
3. "What has been one challenge you've faced as a new learner here, and how are you dealing with it? Does it relate to our school's cultural or language diversity?"
4. "What do you think makes our school a diverse place, and how does that affect you as a learner?"
5. "What advice would you give to other Grade 8 learners who are new to high school in South Africa?"



Assessment Rubric for Panel Discussion (15 marks)

Criteria	3 marks	2 marks	1 mark
Personal Introduction and Cultural Context	Clearly introduces self, articulates background and origin in South Africa; strong cultural relevance.	Introduces self with some context; cultural link attempted.	Introduction lacking detail; minimal cultural link.
Expression of Feelings and Experiences	Articulates feelings and high school experiences thoughtfully.	Expresses feelings and experiences clearly.	Limited expression of feelings/experiences.
Engagement with Diversity and Inclusion	Thoughtfully discusses diversity/inclusion in school; South African context evident.	Talks about diversity/inclusion; some points made.	Little comment on diversity/inclusion.
Communication and Interaction Skills	Speaks clearly, confidently; interacts well with moderator and panel.	Good communication; interacts adequately.	Communication sometimes unclear; limited interaction.
Depth of Reflection and Insight	Shows strong reflection on experience; insightful comments made.	Shows some reflection; comments reasonable.	Limited reflection/insight shown.

Total: 15 marks

Figure 4 is another example of a culturally relevant assessment task that can be co-created using GenAI. Figure 4 depicts the panel discussion guidelines to learners, that Meta AI created, which we prompted it to do. PSTs would find these guidelines useful in their teaching as it would streamline and make the assessment process smoother. Moderator guidelines were also created to facilitate and prompt further understanding when learners work in groups. Meta AI was able to create a very structured and logical assessment that Grade 8 learners can follow. In the same instruction, we prompted Meta AI to create a culturally sensitive assessment rubric to assess this task out of 15 marks. The LLM was able to tabulate the rubric in seconds and is useful in assessing learners who are 'excellent' and who 'need improvement'.

Discussion

The findings of this study demonstrate the potential of GenAI to co-create culturally relevant assessment materials for learners in school contexts. The researchers used Meta AI to generate culturally relevant assessments that may resonate with learners from diverse backgrounds. This co-creation aligns with CRP principles (Ladson-Billings, 1995) which foreground three interrelated criteria: supporting academic success, promoting cultural competence, and developing critical consciousness. The co-creation process between PSTs and Meta AI not only provides opportunities to design assessments that are intellectually rigorous and academically challenging but also affirms learners' cultural identities by embedding local experiences, languages,

and knowledge systems into materials design. In this way, the integration of GenAI can support learners' academic achievement while simultaneously promoting cultural competence, as learners see their identities and communities reflected in the materials. This integration of GenAI into CRP frameworks extends critical reflection principles (Brookfield, 2017) into the digital age. It highlights the need for initial teacher education (ITE) to infuse GenAI training, critical examination, and collaborative co-creation processes into its programs.

The findings (Figures 1-4) indicate that Meta AI can generate culturally sensitive assessment materials. It follows prompts and infuses local references and addresses socio-cultural challenges. This echoes Gay's (2018) argument that culturally responsive teaching validates and affirms learners' cultural heritages while bridging them to academic learning. In the South African context, where education has historically privileged Eurocentric knowledge at the expense of African epistemologies (Fatih Tofiq, 2025), embedding learners' cultural and linguistic resources into classroom assessments is essential for equity (Hoadley, 2018; Pratschke, 2024; Vandeyar, 2017). GenAI can potentially counter deficit views of learners from marginalised communities and contribute to more socially just pedagogical practices by positioning learners' cultural repertoires as assets.

Furthermore, Meta AI is adaptable as it ensures age-appropriate language, tone, and level of difficulty which makes it an effective tool for PSTs. However, the risk of cultural bias in GenAI-generated materials persists (Popenici, 2023). PSTs should critically evaluate and refine GenAI-generated materials to ensure their alignment with CRP principles. Notably, this evaluative burden cannot rest solely on the practitioner; the prompt architecture itself must be interrogated. The observed cultural stereotyping, such as assumptions about "appropriate" cultural attire in school settings, may not reflect GenAI errors per se, but rather a deficit in the prompt design: namely, the absence of explicit prompts that instruct the model to avoid reductive or essentialist cultural tropes. Moreover, the underlying training corpus and absence of embedded CRP frameworks within the GenAI's operational logic may perpetuate cultural biases. Yet, as Naidu and Sevnarayan (2023) caution, this evaluative process itself is not neutral; it is inevitably filtered through the PSTs' own cultural lenses, positionalities, and potential blind spots. Without explicit training in critical cultural reflexivity, PSTs may unintentionally reinforce dominant norms or misrecognise culturally critical expressions as "inaccurate" or "irrelevant." Therefore, future prompt engineering must be conceived not merely as a technical skill, but as a pedagogical imperative; one that requires designers and users alike to include CRP principles into the prompt generation. This includes prompts such as "avoid cultural stereotypes", "centre community-defined norms of appropriateness", and "interrogate assumptions about cultural representation". Such scaffolding is imperative to ensure that GenAI serves as a tool for equity rather than a conduit for bias. Thus, the co-creation model should be scaffolded not only by CRP frameworks but also by guided mentorship, peer dialogue, and structured reflection protocols that assist PSTs to interrogate their own assumptions while evaluating LLM outputs. Only then can critical evaluation become a tool for dismantling bias, rather than replicating it.

The findings display the significance of the co-creation process between PSTs and Meta AI. PSTs would be able to take ownership of materials development, instil a sense of confidence and competence in their teaching practices when they co-create materials by collaborating with GenAI. This approach supports Ladson-Billings' (1995, 2009) notion of teachers as 'cultural mediators', where PSTs may be able to bridge the gap between learners' cultural backgrounds and their academic content. The co-creation process also promotes critical thinking and creativity among PSTs, which is echoed by Paris's (2021) emphasis on culturally sustaining pedagogy.

This study extends the work of Bozkurt and Sharma (2023) on personalised learning experiences with GenAI. It highlights the potential for cultural responsiveness in assessment materials. The findings further confirm Apple's (2004) argument that education should acknowledge and address the socio-cultural realities of learners' lives. Our findings also complement Kasneci et al.'s (2023) research on GenAI-generated feedback and demonstrates the adaptability of GenAI in diverse educational contexts. Importantly, this study addresses the gap identified by Naidu and Sevnarayan (2023) regarding the lack of research on GenAI's cultural implications.

This research reconceptualises teacher agency in the context of GenAI-generated materials. PSTs are no longer passive recipients of pre-designed materials but rather active co-creators who utilise GenAI to develop culturally responsive assessments. This shift in teacher agency corroborates Gay's (2018) notion of teachers as 'cultural scaffolders', who support learners' academic and cultural development. This study encapsulates its pedagogical significance through the integration of GenAI in teacher education which can transform PSTs' understandings of culturally relevant pedagogy. PSTs are thus able to develop essential skills to designing assessments that promote cultural responsiveness and enhancing teaching practices. The findings also support Brookfield's (2017) critical reflection which emphasises the importance of teachers as agents of social change.

While some critics argue that GenAI-generated materials may perpetuate cultural biases and stereotypes (Popenici, 2023), we argue that when critically evaluated and refined by PSTs, GenAI can produce culturally responsive assessments that challenge dominant epistemologies. Contrary to concerns that GenAI may homogenise educational experiences (Kasneci et al., 2023), our research demonstrates that Meta AI can adapt to diverse cultural contexts and promote culturally sustaining pedagogy (Paris, 2021). Furthermore, we challenge Ladson-Billings' (1995) assertion that teachers alone are responsible for culturally relevant pedagogy; instead, our findings suggest that GenAI can augment teachers' cultural responsiveness, enhance academic achievement and create socio-political consciousness. We refute the notion that technology inherently undermines cultural relevance (Apple, 2004; Brookfield, 2017), as the findings confirm that GenAI has the potential to transform ITE and promote the design and use of culturally relevant

assessment materials.

Limitations

The study relied on Meta AI's capabilities, which may not represent the full spectrum of GenAI tools. Furthermore, the co-creation process was facilitated by the researchers which could have potentially influenced the generated materials' cultural relevance. In addition, the study's focus on English language teaching may not translate to other subjects or disciplines. The lack of longitudinal data also restricts an understanding of the long-term impact of GenAI-generated materials on learner outcomes. Lastly, the study's reliance on prompt-based generation may overlook potential biases in the prompts themselves. Despite these limitations, our exploration with Meta AI shows how PSTs can create a collaborative co-creation process to ensure the production of culturally relevant materials.

Conclusions, implications and recommendations

This research addresses a significant gap in existing literature by exploring GenAI's potential to co-create culturally relevant assessment materials for specific classroom contexts. The main findings indicate that Meta AI can generate culturally responsive assessment materials. Specifically, this study demonstrates the possibility of integrating GenAI into ITE to address the need for culturally sustaining pedagogy. The study's findings also question the implications for PSTs' education and training if we are to empower them to embrace the use of GenAI and CRP in their materials development. This aligns with Ladson-Billings' (1995, 2009) call to re-examine teacher preparation which highlights the imperative to rethink and reimagine ITE programs.

The implications of this study suggest a paradigm shift in ITE and instructional design. Teachers would be in a position to create culturally relevant assessment materials that promote social justice, equity, and inclusivity if they are open to integrate GenAI into their practices. The findings in this study have significant implications for ITE programs and highlights the need for GenAI literacy, GenAI pedagogy, prompt generation, and culturally relevant teaching methodologies. Furthermore, this research underlines the potential for GenAI to address cultural disparities in educational materials, particularly in marginalised communities. These implications extend beyond the classroom and contributes to a broader vision of education as a catalyst for social change, cultural empowerment, and teacher agency.

We recommended that ITE should empower PSTs to integrate GenAI and CRP into their design of assessment materials. GenAI training and prompt generation techniques should be integrated into PST curricula. This should be accompanied by an emphasis on critical evaluation and refinement of GenAI-generated materials that ensure alignment with CRP principles. Further, ITE programs should create a commitment to social justice and equity by providing resources and support for PSTs to design GenAI-generated materials. For PSTs and practitioners, it is important to develop proficiency in using GenAI tools for developing culturally relevant assessment materials. This involves going beyond technical competence to include acquiring cultural competencies. Teachers engaged in the evaluation of culturally relevant materials must possess not only expertise in GenAI applications but also the cultural skills and qualifications necessary to assess content from diverse socio-cultural contexts. This dual competency ensures that evaluations are rigorous, unbiased, and contextually appropriate, thereby avoiding stereotypes, cultural misrepresentations, or systemic inequities.

Acknowledgments

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Navigating costs: Undergraduate students' perceptions of incorporating the APA guidelines into their assignments

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Abstract

The publication manual of the American Psychological Association (APA) is widely used by undergraduate students across the country for academic writing. While instructors provide guidance on how to correctly implement the guidelines within the manual, many students continue to struggle with this task, often making significant errors in their writing. To explore the challenges students face in applying these guidelines, we adopted a motivational approach, examining the issue through the lens of Situated Expectancy-Value Theory (SEVT), with a particular focus on the perception of cost (i.e., why students may be reluctant to complete the task). One hundred and fifty undergraduate students completed our online survey. Through mixed-method analyses, we explored the multidimensional components of cost, as well as its contributions as a predictor of student burnout. Our results are discussed in terms of recommendations for supporting students' use of APA guidelines, along with limitations and directions for future research.

Introduction

The American Psychological Association's (APA) publication manual is widely used in academic writing, particularly in the social sciences (e.g., psychology, sociology; American Psychological Association [APA], 2020). While instructors emphasize to their undergraduate students that the manual's guidelines should be implemented correctly (Connors, 1999; Mendeley, 2023; Schultz, 2019), many postsecondary undergraduate students continue to struggle with this task and perceive it as burdensome and tedious (Neubauer & Hernaiz-Sánchez, 2025; Van Note Chism & Weerakoon, 2012). As a result, students frequently make significant errors when incorporating these guidelines into their written assignments (e.g., Clark & Murphy, 2021; Landrum, 2013). These errors can include issues with citation formatting, reference list organization, and in-text citations. Support is made available to undergraduate students through various means, such as workshops (Jorgensen & Marek, 2013), online resources (Mandernach et al., 2016), and checklists (Franz & Spritzer, 2006), yet errors persist at significant rates (Onwuegbuzie et al., 2009; Yap, 2020).

To address this issue, some researchers have examined the types of errors students make, hoping to determine where the challenges lie, and from there, inform the development of more targeted supports (e.g., Iqbal et al., 2024; Zafonte & Parks-Stamm, 2016). Alternatively, we have chosen to take a motivational approach to examine undergraduate students' use of the APA guidelines by incorporating a Situated Expectancy-Value Theory lens. In particular, we explored the costs component (i.e., why students do not want to complete the task; Eccles & Wigfield, 2023) to investigate why students continue to make errors when incorporating the APA guidelines into their written work. To begin, we provide a review of the publication manual to provide context for why students continue to make errors when incorporating these guidelines.

The American Psychological Association Publication Manual

At the time of this research study, the Publication Manual produced by the American Psychological Association (APA) was in its seventh edition (American Psychological Association [APA], 2020). The manual is intended to provide authors with guidelines for preparing manuscripts for publication, as well as for students completing written assignments for their courses (APA, 2020; Hughes et al., 2023). It offers comprehensive instructions on formatting various paper elements, adhering to journal article reporting standards for quantitative, qualitative, and mixed methods research, writing style and grammar, bias-free language, formatting tables and figures, and referencing sources (APA, 2020).

For the purposes of our study, we focused specifically on the guidelines related to referencing sources, both in-text citations and reference lists included at the end of student assignments. This section of the guidelines was chosen because students often make significant errors when attempting to apply these citation guidelines (Freysteinson et al., 2015; Iqbal et al., 2024), likely due to the numerous rules that must be followed (Hughes et al., 2023; Zafonte & Parks-Stamm, 2016). Indeed, Mandernach et al. (2016) found that when instructors were asked about students' writing that required APA formatting, the most commonly cited challenge was correctly formatting in-text citations and reference pages.

Moreover, as new editions of the manual are released, existing rules are updated, and new information is introduced. For example, the seventh edition includes guidelines on incorporating bias-free language (APA, 2020). Referencing rules have also changed; among these updates, the publisher location is no longer required in references, and in-text citations for sources with three or more authors now use the first author's name followed by "et al." even on the first citation (Streefkerk, 2024). Complicating matters further, the APA publication manual is only one of several referencing styles students may be required to learn, each with its own rules and conventions, such as the Modern Language Association style (Modern Language Association of America [MLA], 2021), the Chicago Manual of Style (University of Chicago Press, 2024), and the Harvard system (Pears & Shields, 2019).

Incorrectly citing sources can have significant consequences for students, including instances of academic dishonesty such as plagiarism (Zafonte & Parks-Stamm, 2016). Moreover, the frequency in which students are producing errors in their citations is very high. For example, research by Yap (2020) examined 20 master's theses in open institutional repositories and explored the referencing errors. Errors were found across all submissions. This aligns with findings by Lee and Lin (2013), who analyzed 3,564 references across 125 master's theses and reported an average citation error rate of 22.8%, with individual theses showing error rates ranging from 4% to 81.5%. These student-level findings mirror patterns observed at the journal submission level. In fact, Onwuegbuzie et al. (2013) report that citation errors appeared in between 88.6% and 91.8% of manuscripts submitted to the *Journal of Research in the Schools*. Extending beyond individual student work or single disciplinary contexts, Santos et al. (2023) conducted a large-scale analysis across scholarly disciplines and found that citation and referencing inconsistencies are widespread, reflecting entrenched challenges in bibliographic practice. Taken together, these results demonstrate that APA citation errors are not isolated incidents but pervasive across academic writing contexts.

In response, researchers have examined various strategies for teaching citation guidelines, including the use of templates, checklists (Franz & Spritzer, 2006), and gamified learning approaches (Clark & Murphy, 2021), as well as different instructional modalities such as online and in-person formats (Zafonte & Parks-Stamm, 2016). Despite these efforts, persistent errors in students' use of APA guidelines continue to be reported (Gaber & Ali, 2022; Iqbal et al., 2024; Yap, 2020). While previous research has taken a primarily pragmatic approach to addressing these challenges, little has been done to address why these errors are occurring from a motivational perspective. As such, our study aims to extend the current literature by incorporating

a motivational framework, specifically, Situated Expectancy-Value Theory (SEVT; Eccles & Wigfield, 2020), to explore students' errors in APA referencing.

Theoretical framework

Situated Expectancy-Value Theory (SEVT) explores how an individual's beliefs about their capabilities and the perceived value of a task influence their choices, persistence, and performance (Eccles & Wigfield, 2023). For the purposes of this paper, the situation of interest is students' correct use of the APA guidelines for citations and referencing in classroom assignments. Within this context, motivation is driven by two core subjective beliefs that a student holds: expectancy and value. Expectancy refers to a student's belief in their likelihood of success on a task (Eccles & Wigfield, 2020). Expectancy is multifaceted, including *ability beliefs*, wherein one considers their abilities to complete the current task or *expectancy beliefs*, wherein one considers their abilities to complete a future task (Barron & Hulleman, 2015). Previous research which explores pragmatic ways to support students in learning the APA guidelines is aimed at increasing students' expectancy in their ability to complete this task by exploring ways of teaching these guidelines as reviewed above.

Value, the second subjective belief, refers to the overall importance a student attributes to a task (Eccles & Wigfield, 2023). According to SEVT, if students do not perceive value in applying APA citation guidelines, they are less likely to do so. Value is also multifaceted, encompassing intrinsic value, engaging in the task because it is enjoyable, utility value, which involves recognizing the task's practical benefits, and attainment value, where completing the task fulfills a personal need (Barron & Hulleman, 2015). In the context of APA referencing, students may perceive utility value in wanting to ensure their work follows academic rules or attainment value in aiming for high grades, which necessitates correct citation and referencing.

Another important consideration within SEVT is cost. When students engage with a task, they weigh the perceived costs associated with its completion (Eccles & Wigfield, 2023). These costs can also be multifaceted. For instance, the *effort* required to successfully complete a task may not be seen as worthwhile. If completing the task demands significant effort, students may feel they have less time for other preferred activities and, as a result, would have to forgo those preferred activities to complete the task; this is known as *opportunity cost* (Jiang et al., 2018). Costs can also include *ego costs*, in which students are concerned about how others might perceive them if they perform poorly, and *emotional costs*, referring to the negative emotions experienced while completing a task they do not enjoy (Jiang et al., 2018).

In the context of APA referencing, students may perceive costs in several ways. The sheer number of rules involved in correctly formatting references can create a belief of high effort required, which may be viewed as disproportionate to the perceived benefit. Students might feel that time spent on creating the citations for their assignment takes away from more enjoyable activities (i.e., opportunity cost). Additionally, mistakes in APA formatting that lead to academic misconduct could be perceived as an ego cost. Finally, the attention required to follow every guideline may evoke frustration, anxiety, or other negative emotions, highlighting the emotional cost of the task.

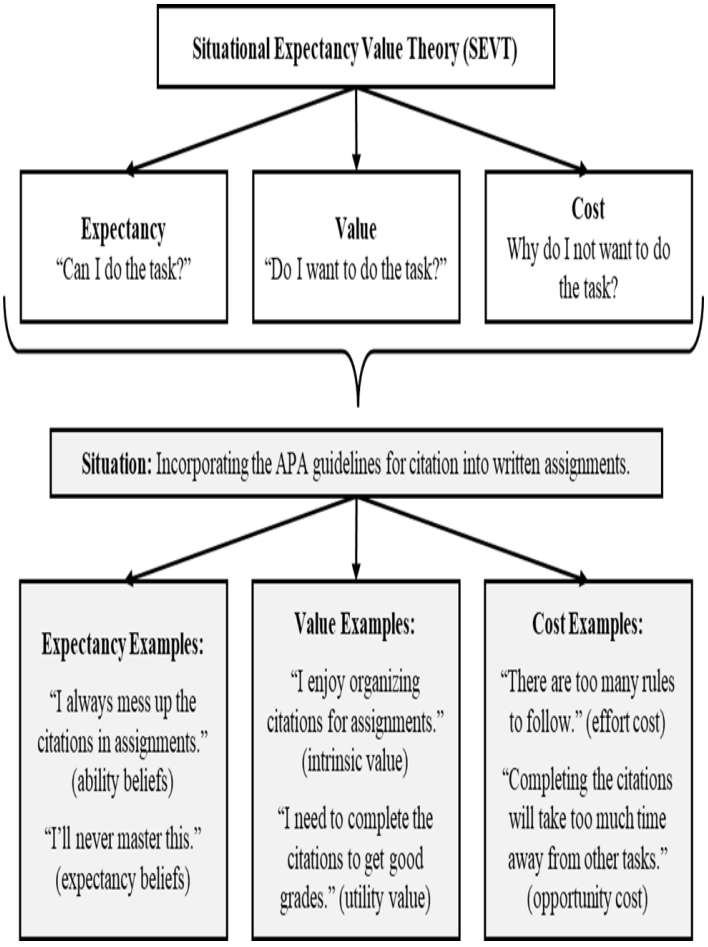

Figure 1: Theoretical framework linking situated-expectancy-value-cost dimensions in the context of incorporating the APA guidelines for citations.

SEVT and the APA Guidelines

We were only able to locate one study that specifically examined the APA citation and referencing guidelines through the lens of SEVT. In this study, Roberts and Goegan (2024) explored undergraduate students' perceptions of expectancy, value, and cost prior to engaging in an APA citation activity. Before completing the activity, students reported high levels of expectancy and value, along with moderate levels of cost. However, following the activity, both expectancy and value decreased significantly. Moreover, when students were asked to self-rate their perceptions of expectancy, value, and cost on a scale from 1 (not at all) to 10 (very much so) and then provide a rationale for their score, students identified a range of contributing factors. These included the effort required, attention to detail, time investment, desire to achieve good grades, use of other citation formats, reliance on external resources, and prior experience with citation guidelines.

To build on this previous research, we aimed to explore the SEVT component of cost more explicitly. Indeed, the approaches to addressing students' errors in applying APA

guidelines have largely focused on the expectancy and value components. For example, studies exploring new teaching strategies to support student learning (Franz & Spritzer, 2006; Zafonte & Parks-Stamm, 2016) primarily target ability beliefs or expectancy beliefs. Similarly, the incorporation of game-based elements into the learning process (Clark & Murphy, 2021; Neubauer & Hernaiz-Sánchez, 2025) is designed to enhance intrinsic value. However, much less is known about the role of cost when it comes to students' motivation to correctly apply the APA guidelines for citations and referencing. As errors continue to be reported in undergraduate students' citation and referencing practices (Yap, 2020), the purpose of the current research was to explore the perceived costs associated with incorporating APA guidelines, with the goal of extending the current literature and informing future instructional approaches.

Moreover, due to the continue errors students make when it comes to incorporating the APA citation guidelines into their writing, we wanted to further our investigation to also examine burnout. Burnout is a state of physical and psychological fatigue and exhaustion that individuals attribute to specific life domains, such as personal circumstances, work responsibilities, or client-related demands (Kristensen et al., 2005). While exhaustion is central to the concept, what distinguishes burnout from general fatigue is the individual's perceived connection between their exhaustion and a sustained, emotionally demanding context, whether academic, professional, or interpersonal. It has been found that 55% of college students experience some degree of academic burnout (Jacobs-Pinson, 2024), making it an important variable to consider.

The current study

To gain a better understanding of the perceived costs associated with integrating the APA guidelines into undergraduate students' written assignments, we investigated how students rate different types of costs and what they perceive as the most challenging elements of adhering to the APA guidelines. Our quantitative research questions were as follows: (a) How do undergraduate students rate various types of costs (i.e., effort, opportunity, ego, and emotional costs) associated with incorporating the APA guidelines into their assignments? (b) How are the cost subscales related to one another? and (c) How do these cost subscales predict academic burnout for undergraduate students? Our qualitative question was: What do undergraduate students identify as the most challenging aspect of incorporating the APA guidelines into their writing at the postsecondary level? Lastly, our mixed-methods research question was: How do the results from the quantitative and qualitative data intersect?

Method

The current study explores student experiences with implementing APA guidelines for citations and referencing, in terms of the perceived costs and associated burnout. We incorporate a mixed-method approach as outlined below.

Procedure

To answer our research questions, we recruited 150 undergraduate students from Canada through the online platform Prolific (https://www.prolific.com). This platform connects researchers seeking participants for their studies with eligible participants who are willing to complete them. Moreover, Prolific allows researchers to target their desired audience, and we limited eligibility to undergraduate students in Canada. Information about the study was provided on the Prolific website, and those interested in participating were able to sign up. Then, participants were given a link to the online survey and consent was established by completion of the survey. The survey itself was hosted on SurveyMonkey© and required approximately 30 minutes to complete. Once participants completed the survey, they were compensated for their time based on the guidelines provided by Prolific (2024). This study was approved by the Research Ethics Board at the researchers' university.

Measures

Demographic measures.

The participants responded to three demographic items that were used to describe the participants in the sample: age, gender, and year of studies. Moreover, these variables were included in Step 1 of our hierarchical regression to account for demographic factors before examining the impact of the cost subscales on burnout.

Quantitative measures.

We adapted the cost subscales of effort, opportunity, ego, and emotion developed by Jiang et al. (2018). Previous use of this measure has indicated a reliability coefficient of .89 (Jiang et al., 2018). We adjusted these items to be specific to the use of the APA guidelines. For example, one of the original items was "doing well in math requires more effort than I want to put into it" was adapted to "implementing the citation guidelines requires more effort than I want to put into it" (italics added for emphasis). Consistent with the original measure, there were three items of each of the three subscales, and participants responded on a scale from 1 (strongly disagree) to 6 (strongly agree). Participants' responses to the three items per subscale were summed and averaged with higher scores indicating greater cost.

We adapted the work-related burnout subscale from the Copenhagen Burnout Inventory, developed by Kristensen and colleagues (2005), to assess burnout related to academic work. Burnout has traditionally been assessed using the Maslach Burnout Inventory (MBI) (Schaufeli & Greenglass, 2001; Schaufeli et al., 2002); however, the Copenhagen Burnout Inventory (CBI) offers a broader and more context-sensitive approach by measuring personal, work-related, and client-related burnout, which have been found to have very high internal reliability ranging from .85 to .87 (Kristensen et al., 2005). Moreover, the CBI has been found to have high predictive validity as well as high convergent and divergent validity. For the purposes of this

study, burnout is conceptualized using the framework of the Copenhagen Burnout Inventory (Kristensen et al., 2005), which operationalizes exhaustion as a core symptom across personal and academic domains, making it particularly suitable for student populations. For example, the item "Do you feel worn out at the end of the working day?" became "Do you feel worn out at the end of the *school day*?" (italics added for emphasis). We also removed the item "Do you have enough energy for family and friends during leisure time?" because it is intended to be inversely scored, and researchers have raised concerns with reverse-scored items, in favor of straightforward questions (e.g., Geiger & Brewster, 2018; Rodebaugh et al., 2011). Students responded to the items on a 5-point scale, using the response options from "a very high degree" to "a very low degree" or from "always" to "never/almost never" based on the parameters of the original scale. Participants' responses to these items were summed and averaged, with higher scores indicating greater burnout.

To ensure the adapted instruments measured the intended constructs in the context of APA guideline use, we examined both validity and reliability evidence. Validity was established through careful adaptation of previously validated scales to the present academic setting (e.g., modifying "doing well in math requires more effort" to "implementing the citation guidelines requires more effort"). The adapted items retained the conceptual meaning of the original measures while aligning with the APA referencing context. We also examined the internal reliability of each of our adapted instruments before conducting out main analyses.

Qualitative measures.

The participants also completed one open-ended question. Participants responded to the prompt "What is the hardest thing about using the APA guidelines correctly?"

Rationale for the analysis

We conducted our analyses in five steps. First, we ran descriptive statistics on the quantitative measures to determine the range, mean, standard deviation, skew, and kurtosis for the study variables. This allowed us to answer our first research question: how do undergraduate students rate the various types of costs? Second, we ran a repeated-measures one-way ANOVA to compare the means between the different types of cost, addressing our second research question: how are the cost subscales related to one another? Third, to answer our next research question, we conducted a hierarchical regression to predict burnout. We hypothesized that higher levels of cost would significantly, positively predict higher levels of burnout, when controlling for demographic variables. Demographic variables were entered into Block 1, while the cost subscales were entered into Block 2. Fourth, we conducted a word cloud analysis to examine the most frequently used words students wrote when answering the question: "What is the hardest thing about using the APA guidelines correctly?" This allowed us to answer our qualitative research question: What do undergraduate students identify as the most challenging aspect of incorporating APA guidelines into their writing at the postsecondary level? Lastly, to answer our mixed-method research question, how do the results from the quantitative and qualitative data intersect?, we inductively coded the participants' responses to the open-ended question above. Then, using the subscales of costs, create a joint display of the costs students associate with incorporating the APA guidelines into their assignments.

Results

Quantitative analyses

Means, standard deviations, skew, and kurtosis for all study variables are presented in Table 1, while the correlations are presented in Table 2.

Table 1: Descriptive statistics for study variables.

Subscales	# of items	A	Range	M	SD	Skew	Kurtosis
1. Gender	1	--	-	1.47	.61	--	--
2. Age	1	--	18-40	22.10	3.55	2.09	6.44
3. Year	1	--	1-5	2.94	1.32	-.13	-1.21
4. Effort	3	.92	1-6	3.29	1.43	.23	-.97
5. Opportunity	3	.94	1-6	2.40	1.33	.81	-.20
6. Ego	3	.93	1-6	3.24	1.47	.13	-.85
7. Emotional	3	.76	1-6	3.10	1.29	.28	-.57
8. Burnout	6	.88	1-5	3.85	.82	-.54	-.23

Table 2: Correlations for study variables.

Subscales	1	2	3	4	5	6	7	8
1. Gender	--							
2. Age	.04	--						
3. Year	-.02	.30***	--					
4. Effort	-.10	.07	-.18*	--				
5. Opportunity	.02	.07	-.16*	.68***	--			
6. Ego	.01	-.01	-.05	.06	.26**	--		
7. Emotional	-.17*	-.01	-.26**	.57***	.58***	.40***	--	
8. Burnout	-.27***	-.20*	-.12	.21**	.22**	.28***	.38***	--

Notes: $^{*}p < .05$, $^{**}p < .01$ and $^{***}p < .001$

A repeated-measure one-way ANOVA with four within-subject factors was conducted to examine the differences between the types of costs. This analysis determined that there was a significant difference between the means of the subscales of cost $F(3, 462) = 23.39$, $p < .001$. Pairwise comparisons concluded that the subscale of opportunity cost was significantly lower ($M = 2.40$) than effort cost (M = 3.29), ego cost ($M = 3.24$) and emotional cost ($M = 3.10$). No other significant differences were found.

Next, we ran a hierarchical regression to examine the predictors of burnout. In the first model, gender and age were significant predictors of burnout, $F(3, 146) = 6.54$, $p < .001$, accounting for 10% of the variance in burnout. Students who were younger and/or female identified more burnout. Year in program was not a significant predictor.

In the second model, we included the subscales of effort, opportunity, ego and emotional cost. The F change was significant. Here, gender and age continued to predict burnout, as well as ego and emotional cost that were positive predictors, $F(7, 142) = 6.99$, $p < .001$. Taken together, the model accounted for 22% of the variance in burnout. Year in program continued to not be a significant predictor, as well as effort cost and opportunity cost. Additional information about the hierarchical regression, including standardized coefficients beta, can be found in Table 3.

Table 3: Hierarchical regression predicting burnout.

Variables	Block 1	Block 2
1. Gender	-.27***	-.22**
2. Age	-.17*	-.20*
3. Year	-.07	.02
4. Effort		.06
5. Opportunity		.02
6. Ego		.19*
7. Emotional		.22*
Adjusted R^2	.10	.22

Notes: $^{*}p \leq .05$, $^{**}p \leq .01$, $^{***}p \leq .001$

Hardest thing about using the APA guidelines correctly

We examined the open-ended responses from participants to the question: *What is the hardest thing about using the APA guidelines correctly? to address our fourth research question: What do undergraduate students identify as the most challenging aspect of incorporating APA guidelines into their writing at the postsecondary level?* We utilized an online word cloud generator (https://www.wordclouds.com) to analyze the words most frequently used by participants in their responses. The software displays words such that the more often a word is used, the larger it appears in the image (e.g., Goegan et al., 2021; Hinkle et al., 2020; Meehan & Howells, 2019). Before creating the word cloud, high-frequency non-specific words such as "the" and "because" were removed from the dataset. In addition, stemming was applied so that words with the same root (e.g., *formatted* and *formatting*) were grouped under the base form (e.g., format). The resulting word cloud is presented in Figure 2.

Next, we identified the 12 most frequently used words by the participants and provided a sample response for each in Table 4. In the sample responses, we highlighted the specific word in bold and the remaining most frequent words in bold grey to demonstrate the extent to which these terms appeared across participants' responses. The most frequent words used by participants were: *format, remember, different, citation, information, rule, thing, use, correct, make, detail, and order.*

Intersection of the quantitative and qualitative data for triangulation

Lastly, to answer our mixed-method research question, we first examined participants' responses to the prompt: "*What is the hardest thing about using the APA guidelines correctly?*" We utilized inductive coding procedures, beginning with multiple readings of participants' responses to ensure familiarity with the content and to preliminarily consider potential themes (Creswell & Guetterman, 2019). We then developed thematic categories and created a codebook, which included definitions for each theme along with illustrative examples from the participants' comments. Finally, we examined how each theme aligned with the cost subthemes of effort, opportunity, ego, and emotional, creating a joint display (Figure 3). In the joint display, the thematic categories are presented on the left, and the subthemes of cost with their corresponding group means are presented on the right. Arrows between the categories and subthemes illustrate the connections between participants' open-ended responses and the scaled measures.

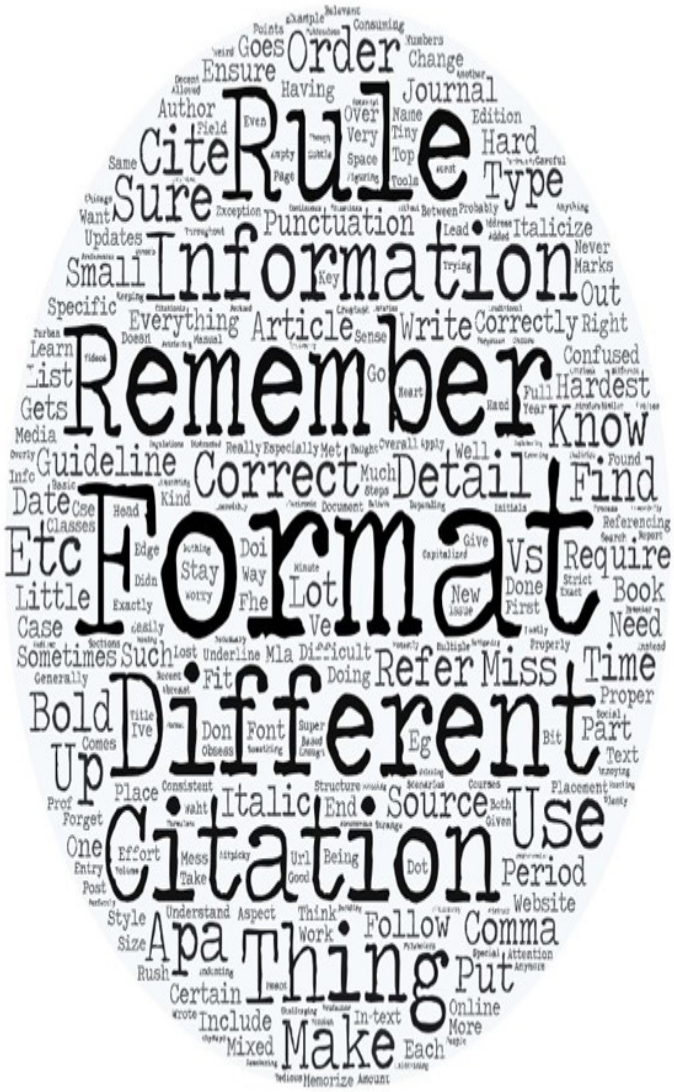

Figure 2: *What is the hardest thing about using the APA guidelines correctly?*

Table 4: *What is the hardest thing about using the APA guidelines correctly?*

Word	Response Rate	Example Response
Format	41 (27.15%)	Proper **formatting** and when using multiple different sources as **format** can be different.
Remember	40 (26.49%)	**Remembering** the specific little details (i.e., what is in italics, how to format a specific entry).
Different	21 (13.91%)	For me, one of the hardest things about using APA guidelines correctly is remembering all the specific formatting rules and details, especially when it comes to citing **different** types of sources like books, journal articles, and websites.
Citation	18 (11.92%)	Not mixing up which parts of the **citation** to italicize with other **citation** formats such as MLA or Chicago [Turabian].
Information	18 (11.92%)	Making sure that you have all the sections of the citation (the **information** required).
Rule	18 (11.92%)	Following all the small **rules** (like where there is a comma instead of a period).
Thing	17 (11.26%)	The hardest **thing** is ensuing [*sic*] the correct use of punctuation.
Use	17 (11.26%)	It's difficult to remember the guidelines since I also needed to **use** MLA in my other classes.
Correct	17 (11.26%)	APA style evolves over time, and new editions or updates may introduce changes to formatting or citation rules. Keeping abreast of these changes and implementing them **correctly** can be a continuous learning process.
Make	17 (11.26%)	While online generators are allowed in most courses, some of them don't work the greatest so you end up **making** manual citations and a lot of effort goes into **making** them.
Detail	16 (10.59%)	Trying to remember all the super specific **details** and having to worry and obsess over all the little rules.
Order	16 (10.59%)	Remembering each thing that's included in what **order**.

Note: Target word identified in bold, other high-frequency words identified in grey/bold.

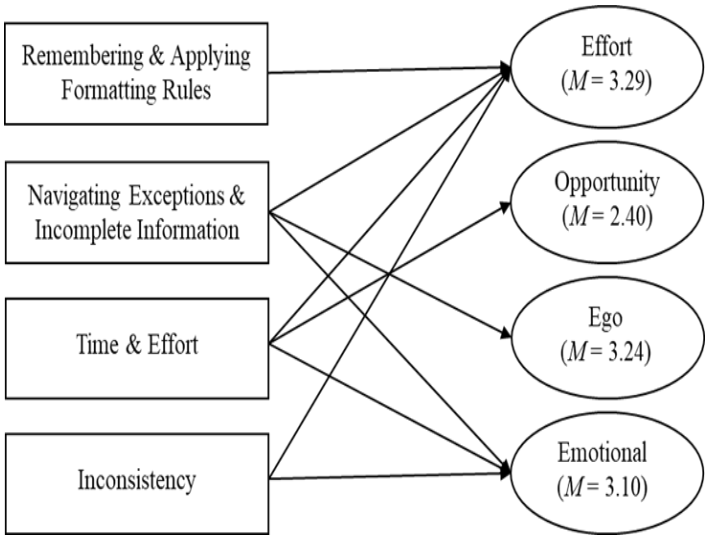

Figure 3: Joint display of sub-themes and cost subscales.

The first theme that emerged from the participants' responses was *remembering and applying formatting rules*, which aligns with the two most commonly used words by participants. This theme refers to the challenge of recalling and correctly applying the numerous elements of the APA guidelines, such as where to place commas and periods, what to italicize or bold, how to capitalize titles, and how to order citation elements. Participants shared comments such as: "remembering the placements of commas and the order of the citations," "remembering the specific little details (i.e., what is in italics, how to format a specific entry)," and "remembering all the specific formatting rules and details, especially when it comes to citing different types of sources like books, journal articles, and websites." From a cost perspective, this theme clearly reflects the effort sub-theme, as participants must exert considerable cognitive resources to remember and apply the APA rules correctly.

The second theme that emerged from the participants' responses was *navigating exceptions and incomplete information*. This theme builds on the previous one by introducing elements of ambiguity and uncertainty, for example, when citation information is missing or when a source does not clearly fit existing APA citation or referencing guidelines. Participants expressed concern about making judgment calls in these situations: "when information is missing, I am never really sure if I am doing it correctly," "weird references… I had to reference a social media post… I was honestly unsure if I did it correctly," and "figuring out what to do with sources that are not journal articles." From a cost perspective, this theme also relates to the sub-theme of effort, but there are also elements of ego and emotional costs. Participants worry about incorporating the APA guidelines incorrectly, reflecting concerns about competence (ego), and wanting to ensure they are making the correct judgement on how to proceed. This can also lead the participants to negative emotions of uncertainty and doubt (emotional).

The third theme that emerged from the participants' responses was *time and effort*. The comments from participants that fit within this theme largely highlight the monotonous and time-consuming nature of creating the citations with the APA guidelines: "It's a time-consuming, tedious thing," "Writing out all the authors is somewhat annoying, especially when some articles have 15+ authors," and "Just the monotonous work of it." This theme primarily reflects effort, but also introduces an opportunity cost, when time spent on APA formatting reduces time available for other tasks. Additionally, it touches on emotional costs, as participants frequently expressed frustration and annoyance with the time demands of the task.

The fourth theme was *inconsistency*. This theme captures the confusion that arises from inconsistent expectations across courses and professors, conflicting formatting styles (e.g., APA vs. MLA), and changes in the APA guidelines over time. Participant comments included: "Each prof wants a different way of citing, so it gets confusing," "Each professor has their own preferences in the version they want," "In different classes, a different format is used, and it gets mixed up in my head," and "It's difficult to remember the guidelines since I also needed to use MLA in my other classes." Participants also acknowledged changes in the guidelines over time, stating, "APA style evolves over time, and new editions or updates may introduce changes to formatting or citation rules," and the hardest part is implementing the guidelines correctly is "when the APA has a new edition." This theme indirectly reflects effort, as students must stay up to date on evolving rules, but it also represents emotional costs, particularly confusion and frustration stemming from

contradictory expectations and changing standards.

Discussion

The current study explored the SEVT cost subscales of effort, opportunity, ego, and emotional in relation to undergraduate student use of APA guidelines for citing and referencing. We incorporated a mixed-method design to understand how these costs are experienced and expressed by students, and the integration of quantitative and qualitative analyses offers a multidimensional perspective on the challenges students face when applying the APA citation guidelines. In this discussion, we examine: (a) the multifaceted nature of cost, and (c) offer suggestions for how instructors might alleviate some of these costs to support students in incorporating the APA guidelines into their written work. In closing, we discuss the limitations of our study and provide some recommendations for future research.

The multifaceted nature of cost

The findings from our research questions highlight that cost is multifaceted, as evidenced by the significant, positive correlations between each of the sub-scales, yet not so correlated as to suggest multicollinearity (Shrestha, 2020). Moreover, the sub-themes in our qualitative analyses showed multiple connections to the cost subscales, and participants often highlighted more than one cost associated with integrating the APA citation guidelines into their written work. This aligns with other components of SEVT, wherein expectancy and value have been identified as involving multiple components yet are often considered subtle in their differences and treated as a single dimension of SEVT (e.g., Eccles & Wigfield, 2020). Therefore, our findings here are consistent with the broader theoretical framework of SEVT, which can be taken to suggest that SEVT is an important theoretical framework for examining the incorporation of APA guidelines into students' writing for future research.

Nevertheless, when these subscales are explored separately, opportunity cost was rated significantly lower than effort, ego, and emotional costs. This could suggest that students do not view incorporating APA citation guidelines correctly as a major imposition that prevents them from engaging in other meaningful tasks. Perhaps, they accept that incorporating APA guidelines into their writing is part of the time already allocated to working on their assignments. Alternatively, the participants perceived the effort cost required to complete the task as higher than the other cost subscales. This is consistent with previous research indicating that students found incorporating APA citation guidelines into their writing to be burdensome and tedious (Neubauer & Hernaiz-Sánchez, 2025; Van Note Chism & Weerakoon, 2012).

The repeated measures ANOVA demonstrates that not all cost subscales are equal when it comes to predicting burnout. Most notably, while effort cost was rated the highest of the four subscales, its presence in the regression did not account for unique variance in predicting burnout. In contrast, ego and emotional costs, though lower in mean ratings, significantly predicted burnout. This suggests that while students may report that incorporating the APA citation guidelines is effortful, this effort alone does not lead to exhaustion or burnout. Conceivably, students expect some effort to be involved with APA formatting, but when this effort is paired with concerns about implementing the guidelines correctly (ego cost) and feelings of frustration or annoyance (emotional cost), it becomes more psychologically taxing, and these components become predictive of burnout. This suggests that the affective component of cost is particularly important when considering student well-being and burnout. Indeed, Edú-Valsania and colleagues (2022) identify the three dimensions of burnout as emotional exhaustion, cynicism or depersonalization, and reduced personal achievement.

It is important to note that while our model accounted for 22% of the variance in burnout, other factors beyond those measured in the current study explain the remaining 78%. This indicates that the present model does not fully capture the complexity of student burnout and underscores the need for future research to consider additional situated and contextual variables. Nonetheless, even with only approximately a quarter of the variance explained, this represents a meaningful finding, as the cost subscales were specific to the implementation of APA citation guidelines, whereas the indicator for burnout reflected students' broader school experience. It would be unreasonable to expect that incorporating citation guidelines alone should account for a larger proportion of variance, given the many other aspects of university life students must navigate, such as studying, applying for scholarships, completing group projects, and seeking employment. Indeed, Pham Thi and Duong (2024) suggest that academic workload is a significant contributor to academic burnout for college students. Thus, in the broader context of school, the 22% explained variance is substantive. Future research may wish to consider aligning the specificity of these two measures. For instance, rather than examining burnout broadly, scholars could investigate burnout specifically associated with completing assignments and then examine the extent to which incorporating APA guidelines into writing contributes to that burnout.

Extending our discussion to the qualitative findings and the mixed-method triangulation, we see that each of the identified subthemes from the participants' responses reflects different cost dimensions, primarily effort, emotional, and ego costs. *Remembering and applying the formatting rules* most closely aligns with effort costs, highlighting the cognitive demand required for students to memorize and apply the citation guidelines. However, the remaining subthemes emphasize the emotional component, wherein students must navigate uncertainty in applying the rules, requiring additional time and effort, and possibly facing inconsistencies to overcome. Moreover, while opportunity cost had the lowest mean score, it remains relevant, particularly when students acknowledge the significant time and effort required to complete the task of incorporating the APA guidelines into their work, in terms of being "monotonous" and "annoying." Therefore, cost is not only multifaceted but also interactive. Students' descriptions of the hardest aspects of using APA guidelines correctly reflect an interconnection between the dimensions of costs.

Indeed, students not only identified themes that fit multiple cost subscales and often mentioned more than one theme in their responses, but these different themes and subscales are individual components of the larger construct (i.e., cost). Thus, the various subscales of cost are interrelated with one another as students navigate incorporating APA guidelines into their written work. As such, future research and student support initiatives should address all subscales of cost, rather than focusing solely on reducing effort or increasing efficiency, which has been the predominant approach to date. Moreover, an interview-style approach to exploring cost may uncover additional elements not identified through our open-ended responses, which could provide valuable insights and potentially account for additional variance in student burnout.

Recommendations for instructors for reducing perceived costs

The current study found that *effort cost* was the most frequently endorsed challenge, especially in remembering and applying detailed APA rules. Given the higher effort and emotional costs students associate with mastering APA guidelines, instructors can alleviate these burdens by providing clear, accessible, and consistent support. To reduce effort costs, instructors might create step-by-step citation guides tailored to the specific assignments, such as a one-page checklist showing how to format journal articles or website references correctly (Franz & Spritzer, 2006). Instructors could also develop or utilize short tutorial videos demonstrating how to build references or share annotated samples of properly formatted reference lists (Jorgensen & Marek, 2013; Mandernach et al., 2016). Breaking down citation tasks into more manageable, scaffolded steps, such as requiring citations for one source type at a time, may allow the process to feel less overwhelming (Svinicki & McKeachie, 2014).

To minimize *opportunity costs*, instructors may utilize brief in-class activities, such as peer-review sessions where students check each other's references for APA compliance. Through a peer-review assessment approach, students reduce the time they need to spend independently struggling with formatting, encouraging collaboration with others, and developing citation skills alongside content knowledge (Topping, 2009). Publicly normalizing mistakes through a sharing of common citation errors seen in previous classes can also reassure students that struggles are typical and part of the learning process (Dweck, 2006). Instructors can respond to this again by embedding citation practice into authentic academic classwork, such as guided referencing exercises during research days, live peer-feedback sessions, or integrating citation assignments with research projects (Nilson, 2016).

Ego costs, including students' fear of making mistakes or appearing incompetent, can be eased by creating a low-stakes learning environment. For example, instructors could assign formative APA quizzes or drafts where feedback focuses on improvement rather than penalizing errors (Hattie & Timperley, 2007; Ormrod, 2020; Zafonte & Parks-Stamm, 2016). This process could also support normalizing errors in these early drafts. To address ego and emotional costs, particularly students' anxiety about doing things "wrong," instructors can incorporate low-stakes assessments, such as ungraded APA quizzes or optional self-checklists (Csikszentmihalyi, 2008).

To address *emotional costs* stemming from confusion and frustration due to inconsistent citation expectations, instructors can provide clear communication about which APA edition is required and explain any deviations in citation style expectations for their courses. A pragmatic step could be maintaining a centralized citation handout guide addressing common questions and updates, accessible to students throughout the term. Additionally, encouraging students to ask questions during office hours or creating online discussion forums facilitates a supportive atmosphere where confusion is addressed promptly and reduces anxiety (Karabenick & Newman, 2013). These concrete strategies can help reduce the perceived costs of using APA guidelines, thereby improving students' motivation, confidence, and overall academic experience.

Limitations and future research directions

The current study offers important insights into student experiences with implementing APA guidelines for citations and referencing, as well as the various associated perceived costs. Nevertheless, three limitations should be acknowledged. First, the undergraduate participants were recruited through the online platform Prolific. While this is not a traditional method of participant recruitment, Prolific has established protocols for vetting participants and ensuring the accuracy of participant accounts (Prolific, 2025). Online subject pools are becoming increasingly popular in research (Palan & Schitter, 2018), and Prolific is considered superior to many other available options (Douglas et al., 2023; Peer et al., 2022). The advantages of using online platforms include the ability to pre-screen participants, increased efficiency, and flexibility in survey design, making this method a valuable option for participant recruitment. As such, the advantages here outweigh potential disadvantages. Moreover, since Prolific operates in many countries, future research could extend our findings, which are currently limited to the Canadian context, to other regions. This would allow for an examination of whether the present findings are representative of students' experiences internationally. Additional demographic considerations could also be explored at that time, as our study was limited to gender, age, and year in program.

Second, while our study focused specifically on APA citation guidelines, it would be valuable to investigate whether similar costs arise when students engage with other forms of academic writing conventions, such as thesis statements, argumentation structures, or literature reviews. Comparative studies between APA and other citation styles (e.g., MLA, Chicago) may also inform style-specific challenges and whether some formats elicit more pronounced cost perceptions. The APA manual is often seen as a rulebook (Inoue, 2015; Sword, 2012), but future research might benefit from treating it as a site of struggle where students' identities, emotional responses, and perceptions of academic

legitimacy intersect. Building on our findings that ego and emotional costs are most strongly linked to burnout, future studies could explore how these costs relate to broader themes like academic identity formation or imposter syndrome. For example, does mastering APA offer a sense of belonging or achievement for some students, while for others, it could become a symbol of academic gatekeeping. Moreover, exploring the dimensions of burnout, such as emotional exhaustion, cynicism or depersonalization, and reduced personal achievement (Edú-Valsania et al., 2022) could extend our finding here.

Third, we incorporated a cross-sectional design, which prevents us from drawing causal conclusions or examining how costs evolve over time, particularly as students progress through their academic careers. Longitudinal studies could help determine if perceived costs decrease with familiarity or whether they shift in nature (e.g., from emotional to opportunity). Indeed, while we found significant and positive correlations between year in program and opportunity and emotional cost, future research could explore these connections more fully. Moreover, while open-ended responses offered valuable insights and were conducive to our online recruitment approach, additional qualitative methods (e.g., interviews, focus groups) could provide deeper understandings of these costs and how they are perceived by students. Lastly, future research might also explore cost perceptions among different student subgroups, including neurodiverse students (e.g., those with learning disabilities or ADHD) or students who do not identify English as their first language, as these students may face unique challenges in interpreting and applying APA guidelines.

Conclusion

In conclusion, while this study sheds light on the nuanced and multifaceted nature of perceived costs associated with implementing the APA citation guidelines, it also opens several avenues for future inquiry. By identifying the emotional and ego sub-scales of cost as positive predictors in relation to burnout, we underscore the importance of addressing not just the technical or procedural aspects of academic writing and the effort required therein but also the affective experiences of students. As academic institutions continue to emphasize writing proficiency and adherence to formal guidelines, it is essential that support systems evolve to recognize and mitigate these costs.

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Appendix: APA guidelines specific items from the survey

Cost subscale items[1]

On a scale from 1 (strongly disagree) to 6 (strongly agree) please respond to the following items.

1. Effort cost
   - Implementing the APA guidelines requires more effort than I want to put into it.
   - It requires too much effort to implement the APA guidelines to get a good grade.
   - It takes too much effort for me to implement the APA guidelines well.
2. Opportunity cost
   - I have to give up other activities that I like to implement the APA guidelines well.
   - I have to sacrifice a lot of free time to be good at implementing the APA guidelines.
   - To implement the APA guidelines, requires me to give up other activities I enjoy.
3. Ego cost
   - Others would think worse of me if I failed to implement the APA guidelines correctly.
   - Others would think I am incompetent if I can't implement the APA guidelines correctly.
   - Others would be disappointed in me if I implemented the APA guidelines incorrectly.
4. Emotional cost
   - Having to implement the APA guidelines correctly scares me.
   - Having to implement the APA guidelines correctly stresses me out.
   - Having to implement the APA guidelines correctly makes me annoyed.

[1] Adapted from Jiang et al. (2018).

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Direct and indirect effects in learning: A case of learners in a university in Singapore

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Abstract

The effects of the direct and indirect relationships of academic performance, motivation, learning approach, course perceptions, academic background, personality, learning environment and prior learning are studied here. The analysis is conducted using Structural Equation Modelling (SEM), allowing for a comprehensive examination of these complex relationships within the framework of the expanded Biggs' 3P model.

Some of the notable findings include: (1) the indirect effects of personality traits -conscientiousness and openness on academic performance; (2) the negative effect of a high level of personality trait agreeableness on academic performance; (3) intrinsic motivation as a key mediator in most of the significant indirect effects as well as being an important independent construct; and (4) the direct effects of personality traits (in particular, agreeableness and openness) on students' perceptions of the course. The insights gained from this study could provide universities with valuable information for designing more effective student support and interventions.

Introduction

Being able to study and understand the various factors that can affect the academic performance of students provides an important handle to design courses and calibrate pedagogical approaches that can bring about effective student learning. This is especially critical in the light of the evolving learning environment, including the disruptions caused by COVID-19 where conventional ways of learning and teaching may no longer be effective in supporting students' learning needs (Sam, 2022).

While there is a fair number of studies attempting to research factors associated with academic performance, the majority of these studies tend to examine these factors as either individual contributions or only for a small set of them. Teaching and learning interactions are often complex, with many factors contributing in a network of influences such that an individual contribution can at best provide an indication, but often the effect needs to take into account the holistic contributions of these factors taken as a whole. In other words, it is likely that interactions in a model are not a causal chain of independently constituted components over time but are the effect of a complex ecology of factors (Trigwell & Prosser, 1997). This is consistent with Chung and Chapman's (2023) affirmation that a student's learning is strongly influenced by multiple factors.

Given the above, the present study seeks to understand the nature and extent of the complex relationships among the factors, or attributes, that can be identified as potential contributors. These would include students, learning and course attributes, linking to the determinants of academic performance. An understanding of how these interact and collectively contribute to effective learning has the potential to guide and facilitate the development of appropriate support and interventions for learning, as well as help to improve the development of curriculum and assessments. While the findings are likely to be context dependent, they can still potentially contribute to theory affirmation and modification.

The study was conducted in a university which offers part- and full-time degree programmes primarily for working adults and students who matriculate directly after pre-university or equivalent education, respectively. This diversity of student profiles would add to the complexity of the interactions of students' attributes and their influence on curriculum and its delivery.

Framing of the research

This study uses the Biggs 3P model (Biggs, 1989) as its initial framing to provide guidance for its design. In its original form, the 3P model conceptualises the learning process as an interacting system of three sets of variables: the learning environment and student characteristics (presage), students' approach to learning (process) and learning outcomes (product). For this study, the attributes within each set, however, are insufficient to account for the complexities of the interactions examined. This resulted in the need to expand the 3P model in order to investigate directional understanding of direct and indirect relationships across a broader range of presage and process attributes with respect to the product. The expanded 3P model, with the additional attributes (in italics) is as shown in Figure 1.

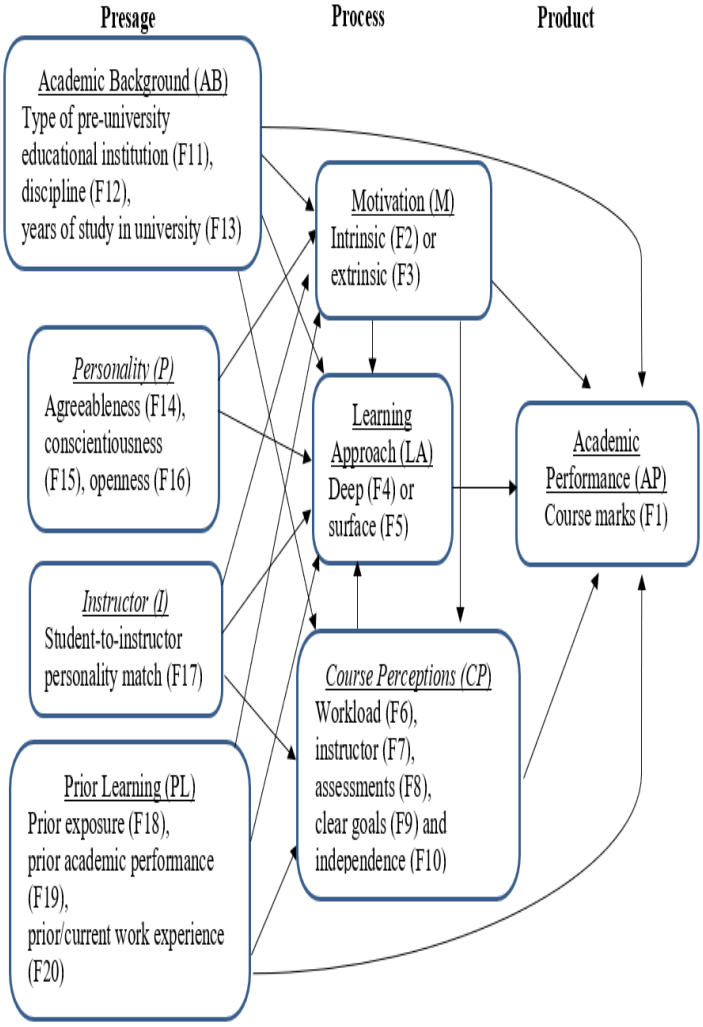

Figure 1. The expanded 3P model of teaching and learning (Research framework).

The expanded model allows for deeper insights that can contribute to how the university can respond in terms of targeted support, appropriate interventions, and refinements of curriculum and its delivery. The expanded model was also discussed by Tan et al. (2024).

Presage

This study aims to investigate various personal characteristics of students as presage factors that may influence academic performance. The attributes covered and the rationale for their inclusion are shared below.

Academic background: Prior studies have suggested that where students come from, in terms of different pre-university educational experiences, could have an impact on their subsequent learning experience in institutions of higher learning (Hassan et al., 2020; Kilishi, 2021). As an illustration, Kilishi (2021) found that the academic performance of

students who attended public schools outperformed those who attended private schools for first-year students majoring in Economics at a university in Nigeria. Also, in a more recent study based on 367 undergraduate accounting students in a Malaysian university, it was found that students from national secondary schools performed significantly better than those from boarding schools and religious secondary schools (Hassan et al., 2020). These different educational experiences are related to, and could have consequence for, which discipline the student would want to pursue. In fact, the selection of discipline to pursue is often complex, involving numerous external (e.g., financial, accessibility and social) and internal (e.g., personality traits and motivation) considerations (Prakasam & Gopinathan, 2019; Vedel, 2014). In addition, it seems that students' adoption of learning approaches depends on the discipline they are in (Smith & Miller, 2005). Taken as a whole, it is crucial to examine the students' discipline selection in this study.

An attribute that has not received sufficient attention is the 'Years of study'. Its inclusion here is motivated by the question of whether a student whose progress through the university programme is taking longer than the norm has any bearing on his/her academic performance. It is noted that the pace of progress can be due to a number of reasons, including work commitments and academic struggles, which would balance against the student being more familiar with the learning environment.

Personality: The personality attributes, specifically agreeableness, conscientiousness and openness, have been found by a meta-analysis conducted by Vedel (2014) to be significantly correlated to academic performance, with conscientiousness being the strongest predictor.

Instructor: Instructors are an important part of the learning environment as they shape students' learning experiences and outcomes. As the personality of instructors could affect their teaching style, as highlighted by Kim and MacCann (2016), and in turn student learning, a student-to-instructor personality attribute match is created, whether the student's core personality trait matches that of the instructor's core personality trait.

Prior learning: Prior learning has been identified as an important determinant of academic performance in higher education (Aluko et al., 2016; Ellegood et al., 2019; Robbins et al., 2004). For example, Garon-Carrier et al. (2016) indicated that prior academic achievement could lead to subsequent intrinsic motivation, which has the potential to affect students' academic performance.

On the other hand, some studies indicated that the impact of prior knowledge on academic performance is less certain (Bone & Reid, 2011; Du Plessis et al., 2005; Schneider & Preckel, 2017). Prior studies seem to suggest that the impact of prior knowledge on academic performance might be debatable on a broader scale. Prior exposure (through self-reporting) will be used as a proxy for prior knowledge for this study, as there is an overlap between prior exposure and prior knowledge, and no assessment will be done in this study to assess the level of mastery.

Similarly, there seem to be inconsistent findings across different studies about the relationship between prior work experience and academic performance (Slover & Mandernach, 2018; Mar et al., 2010; Surridge, 2009). Despite the uncertainties, both prior exposure and prior work experience have been included in this study to better understand their effects on students' academic performance.

Process

The process factors within the 3P model pertain to how students learn. Naturally, the factor of 'learning approach' falls within the process domain, just as in the original 3P model.

Given that personality traits of students were strongly associated with their intrinsic and extrinsic motivation (Ariani, 2013), 'Motivation' is deliberately placed as part of the process domain, which would allow for the investigation of how the presage attributes can affect motivation (which in turn can affect learning approach and academic performance either directly or indirectly).

As for 'Perception', it is recognised as an individual's primary form of cognitive contact with the world around him/her (Efron, 1969) and hence, course perceptions represent students' form of cognitive contact with their learning environment. These perceptions are formed and continually evolve during the course of learning as students have more contact with their instructor as well as the curriculum. Within this context, course perceptions are arguably part of the process domain.

Several studies have indicated that students tended to adopt deep learning approaches if they had positive perceptions of their course (Abraham, 2006; Faranda et al., 2021; Richardson et al., 2007). However, Nijhuis et al. (2007) had found no direct relationship between personality traits and course perceptions, concluding that the educational programme did not seem to favour any particular kind of students. Despite this, it is prudent to investigate if the relationships between the presage factors and course perceptions could be indirect; thus, course perception is included.

Product

Learning outcomes encompass core subject-based outcomes, personal transferable outcomes, and generic academic outcomes (Allan, 1996) – i.e., learning outcomes include both academic performance and non-academic developments. The challenge lies in the design of assessments to capture all these aspects. More often than not, universities tend to rely primarily on students' grade-point average (GPA) as a proxy of their academic performance. GPA – the weighted mean of course marks (or grade points) for courses required to get a formal academic qualification – is, in fact, the most common quantitative measure of cognitive skills and abilities acquisition (Chemers et al., 2001; Plant et al., 2005; Richardson et al., 2012).

Using our university as the reference point, it is hoped that the insights gained from this study can be extended to universities of a similar nature.

Overview of interactions studied

Various studies have indicated that a student's adoption of a learning approach is influenced by his/her motivation, course perceptions, academic background, personality, learning environment, and prior learning (Beckwith, 1991; Cipra & Müller-Hilke, 2019; Lizzio et al., 2002; Mayya & Roff, 2004; Tohidi & Jabbari, 2012; Trigwell & Prosser, 1997). It was also argued that the interpretation of interactions in a model should not be as a causal chain of independently constituted components over time, but as a holistic contribution of the various factors found to be statistically significant. To date, there is, however, no comprehensive study that examines all these potential determinants simultaneously. As such, two important considerations were applied in the study of these relationships. These are:

(1) Prior studies that examined attributes of interest primarily in isolation or in small sets; and

(2) The importance of examining the complex relationships across the various attributes simultaneously.

The expanded 3P model sketches out the pathways linking the attributes across the three sets of variables – Presage, Process and Product. These pathways are represented by the arrows in Figure 1. A direct relationship refers to the examination of how one attribute affects another, whereas an indirect relationship examines the effect one attribute has on another attribute when mediated by at least one other attribute. These formulations provide a handle to study the complex interactions amongst the attributes, so that the insights gained can inform teaching and learning practices. In examining the myriads of relationships within the expanded 3P model, seven sets of relationships (pathways) have been shown to have statistically significant contributions to understanding factors that affect student learning. These are grouped as hypotheses H01 to H07 and summarised in Figure 2 (see Appendix A for a larger image).

To test the hypotheses, the relationships were examined using structural equation modelling (SEM).

Methodology

Participants and instruments

The research sample comprised 475 students from the university. The research was conducted in 2022 using data collected in 2021 by way of a self-administrated and self-rated structured questionnaire comprising four sections: (1) Revised Two-Factor Study Process Questionnaire (R-SPQ-2F) to measure two learning approaches: Deep and Surface (Biggs et al., 2001); (2) Revised Course Experience Questionnaire (CEQ) to measure students' perceptions of

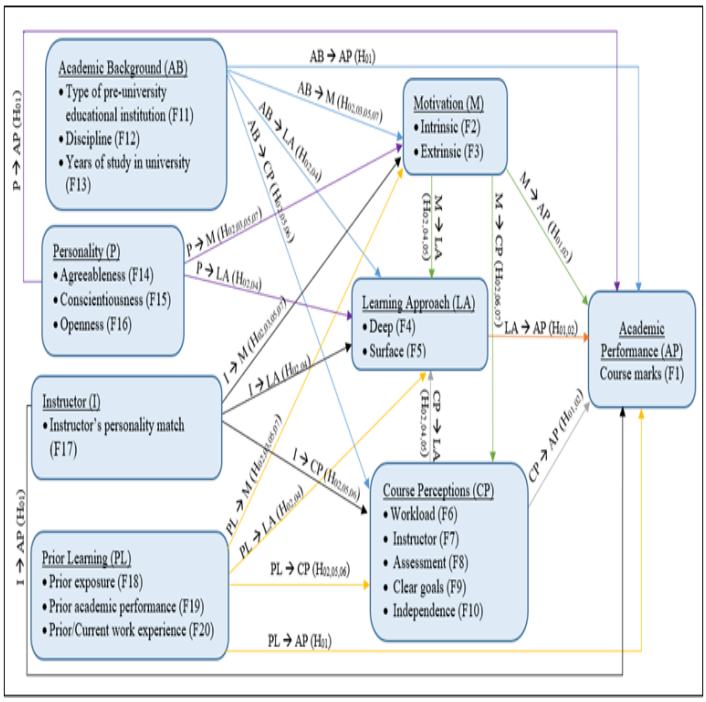

Figure 2. The expanded 3P model of teaching and learning (Research framework).

Instructor (i.e., Teaching), Workload, Assessments, Clear Goals and Independence (Ramsden, 1991); (3) The Big Five Inventory (BFI) to measure personality traits, Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness (John & Srivastava, 1999); and (4) The Motivated Strategies for Learning Questionnaire (MSLQ) to measure the academic motivation of students: Intrinsic and Extrinsic (Pintrich et al., 1993). Consistent with prior studies (see, for example, Guo et al., 2021; Liu et al., 2023), only selected, context-relevant (and not all) MSLQ constructs were used in the research and SEM models. Students' academic performance in the form of course marks was extracted from the student information system. Ethics clearance had been obtained from the Institutional Review Board of the University for this study prior to the data collection.

Procedure

The survey was administered (via Qualtrics) to students taking analytics and marketing courses in the January and July semesters in 2021. The responses collected were generally within the mean and standard deviation ranges reported by prior studies. Hence, the students' responses were generally typical of those of other students in other settings.

SEM examines the structure of interrelationships represented by a series of equations that illustrates all the relationships among constructs (the dependent and independent variables) involved in the analysis. SEM has the ability to incorporate latent variables into the analysis. Researchers normally first draw upon theory, prior experience, and the research objectives to distinguish which independent variables predict each dependent variable before using SEM for analysis. Through expressing a theory in terms of relationships among measured variables and latent

constructs, researchers use SEM to assess how well the theory fits reality as represented by data. Therefore, SEM provides a conceptually appealing way to test theory to analyse the nature and extent of the complex relationships among latent constructs (motivation, learning approaches, course perceptions and personality) and the measured constructs (academic performance, academic background, student-to-instructor personality match and prior learning) to test the hypotheses.

Varoquaux (2018) emphasised that cross-validation is a crucial tool to establish model generalisability as it is the only non-parametric method to do so. Weston and Gore (2006) also highlighted that it is ideal to test the SEM model on a separate (cross-validation) sample. To evaluate the comparability of the January and July responses, several statistical analyses were conducted. The t-test results showed no significant differences across all constructs but one, indicating that responses from both semesters were similar. The only exception is the deep learning approach. However, the Cohen's d of -0.27 (small effect) for the deep learning approach indicated that the responses for the January semester were largely similar to those of the July semester. A comparison of the score distributions further confirmed substantial overlap between the two groups, supporting the conclusion that the responses for the deep learning approach between the two semesters were similar. Based on this, responses from the January semester are used to build the SEM model and responses from the July semester are used to cross-validate the model. The cross-validated model is then applied to all the data (both the January and July semesters) to derive the final SEM model.

Table 1. Results for EFA.

Constructs	Individual Constructs	Removal of Items	Findings	KMO[a] (After removal of items if any)	Cronbach's Alpha (After removal of items if any)
Motivation (M)	Extrinsic	No items removed	Appropriately loaded with all loadings >0.62	0.743	0.756
	Intrinsic	No items removed	Appropriately loaded with all loadings >0.61		0.779
Learning Approach (LA)	Deep	No items removed	Appropriately loaded with all loadings >0.49	0.810	0.851
	Surface	No items removed	Appropriately loaded with all loadings >0.42		0.802
Course Perceptions (CP)	Workload	No items removed	Appropriately loaded with all loadings >0.56	0.861	0.737
	Instructor	One item removed	Appropriately loaded with all loadings >0.47		0.854
	Assessment	No items removed	Appropriately loaded with all loadings >0.43		0.674
	Clear Goals	Five items removed	Construct was not reliably measured in the local context and hence removed from further analysis		
	Independence	Six items removed	Construct was not reliably measured in the local context and hence removed from further analysis		
Personality (P)	Agreeable -ness	No items removed	Appropriately loaded with all loadings >0.43	0.816	0.791
	Conscientious -ness	No items removed	Appropriately loaded with all loadings >0.50		0.770
	Openness	Two items removed	Appropriately loaded with all loadings >0.43		0.784

a: Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy

Results

Exploratory and confirmatory factor analyses

Exploratory (EFA) and confirmatory factor analyses (CFA) were conducted before the final SEM was performed. EFA using varimax rotation with Kaiser normalisation was conducted to explore the underlying factor structure for the four latent constructs (namely, personality, motivation, learning approach and course perceptions) without imposing a preconceived structure on them. Following this, CFA was used to verify the factor structure for these constructs. Table 1 summarises the EFA results.

For course perceptions, the items for clear goals and independence were not appropriately loaded as intended; hence, the misplaced items were removed, EFA was re-performed. In particular, the items for clear goals were loaded onto the assessment as well as independence constructs; for independence, the items were loaded with items for clear goals. As clear goals and independence could not be reliably measured in the local context, they were removed from further analysis. Hence, only workload, instructor and assessment were included in the SEM model. Although one item for instructor was removed (out of seven) and two items for openness were removed (out of ten), Table 1 (showing factor loadings and the Cronbach's Alpha) indicated that these two constructs were measured reliably (Hair et al., 2018) after the removal of these items.
To test the hypothesis that a relationship between the measured items and their underlying latent construct exists, CFA (or the measurement model for each questionnaire) was performed. The model was evaluated using two sets of indices: (1) convergent validity (CV), discriminant validity (DV), R-square, construct reliability (CR), and variance extracted (VE) to examine the validity and reliability of the constructs/models; and (2) the absolute, parsimony and incremental indices to assess the model fit.

Due to low R-Square, two items were removed for motivation, and this improved the validity and reliability of the construct. Parcelling of items (Matsunaga, 2008) was performed for the learning approach and personality to improve the fit of the measurement model, as several of the items did not meet the threshold for R-square. This led to better measurement models for both learning approach and personality. A total of six items were removed for course perceptions due to low R-square. After the removal, the validity and reliability improved, and the fit of the measurement model for course perceptions was acceptable.

To test the measurement model for the four questionnaires in one SEM model, all the remaining items of the 10 latent constructs (i.e., F2 to F10, F14 to F16 – See Figure 2) were included in the model. The CR for all constructs is greater than 0.7 (benchmark), except for assessments (which is slightly below 0.7 at 0.67). However, the level of CR for assessments is deemed to be in the acceptable range

(Hair et al., 2018). The VE for all except two constructs are greater than the benchmark of 0.5. In particular, the VE for intrinsic motivation is very close to 0.5 (0.48); although the VE for assessments is 0.41, its Cronbach Alpha indicated that it is within the acceptable range (Hair et al., 2018). DV is supported as the CR for all the constructs is greater than the squared correlation among the constructs, which range between 0.00 to 0.43 (both inclusive). In addition, the square root of the VE for each construct is greater than its correlations with other constructs (Fornell & Larcker, 1981). The absolute, parsimony and incremental indices are shown in Table 2, with the benchmarks indicated.

Table 2. Fit indices for the four questionnaires.

	χ^2/DF	SRMR[a]	RMSEA[b] Estimate	RMSEA[b] Lower 90% C.L	RMSEA[b] Upper 90% C.L	CFI[c]
Threshold	<=2	<=.08	<=.06	~.00	<=.08	>=.90
Model	1.37	.061	.045	.036	.053	.936

a: Standardised Root Mean Square Residual; b: Root Mean Square Error of Approximation; c: Comparative Fit Index

All the fit indices meet the desired benchmarks. Overall, the results indicate that the measurement of the constructs is appropriate, and hence it is appropriate to proceed with SEM.

Structured equation modelling

Structured equation modelling (SEM) was first performed (using SAS programming and IBM-SPSS AMOS v26) on the responses from the January semester. Model modifications were then done to improve the model fit. Based on the Wald test (to delete insignificant paths), Lagrange Multiplier (to add significant paths) and Chi-Square difference test (to assess the path deletions/additions), modified models were then estimated and evaluated (Ullman & Bentler, 2012). Figure 3 shows the paths that were deleted and added after 16 iterations of model modifications (12 paths were deleted and 3 paths were added).

Similar to the evaluation of CFA, the same set of fit indices was examined to determine the model fit. As can be seen from Table 3, the fit indices meet all the benchmarks.

Table 3. Fit indices for the modified model (January semester).

	χ^2/DF	SRMR	RMSEA Estimate	RMSEA Lower 90% C.L	RMSEA Upper 90% C.L	CFI
Threshold	<=2	<=.08	<=.06	~.00	<=.08	>=.90
Model	1.43	.077	.049	.040	.056	.920

The modified model was further cross-validated using the responses from the July semester. Table 4 shows the fit indices of the cross-validated model.

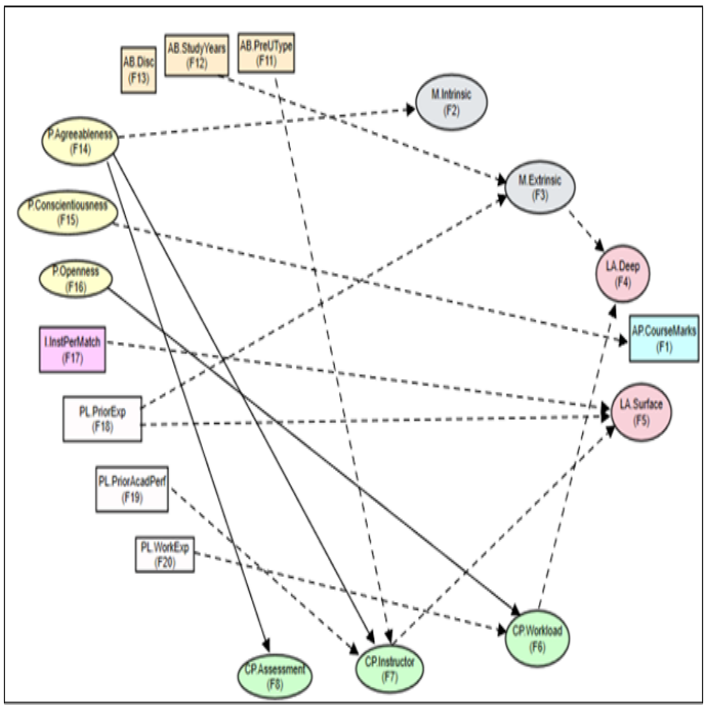

Figure 3. Deletion and addition of paths (Continuous line indicates deletion and dotted line indicates addition).

Table 4. Fit indices for the cross-validated model (July semester).

	χ^2/DF	SRMR	RMSEA Estimate	RMSEA Lower 90% C.L	RMSEA Upper 90% C.L	CFI
Threshold	<=2	<=.08	<=.06	~.00	<=.08	>=.90
Model	1.91	.079	.056	.051	.061	.880

O'Rourke and Hatcher (2014) stated that it is not atypical for an acceptable model to meet only a few desired thresholds but not all. The model indices (see Table 4), except for CFI (which is 0.88 – vis-à-vis the 0.90 benchmark), indicate that the SEM model constructed based on the January data was able to fit the responses for the July semester. Hu and Bentler (1999) acknowledged that in practice, especially in applied fields like education, CFI values of more than 0.85 could be accepted when other indices (e.g., RMSEA) support model adequacy. In addition, Shi et al. (2019) concluded that RMSEA is a more robust index when comparing models of different complexity. Therefore, the model has been cross-validated and hence has model generalisability. Next, the SEM model was applied to the January and July semesters (combined) to test the hypotheses. The fit indices are shown in Table 5.

Table 5. Fit Indices for the SEM model (January and July semesters).

	χ^2/DF	SRMR	RMSEA Estimate	RMSEA Lower 90% C.L	RMSEA Upper 90% C.L	CFI
Threshold	<=2	<=.08	<=.06	~.00	<=.08	>=.90
Model	2.09	.070	.048	.044	.052	.910

The model indices meet the benchmarks. The χ2/DF of 2.09 is very close to 2 and is within the acceptable range (Hooper et al., 2008). Hence, it can be concluded that the SEM model adequately fits the responses for both semesters. Figure 4 shows the final research framework with a new arrow added from personality to course perceptions, indicating the existence of direct effects from agreeableness to instructor, agreeableness to assessment and openness to workload (i.e., three new paths).

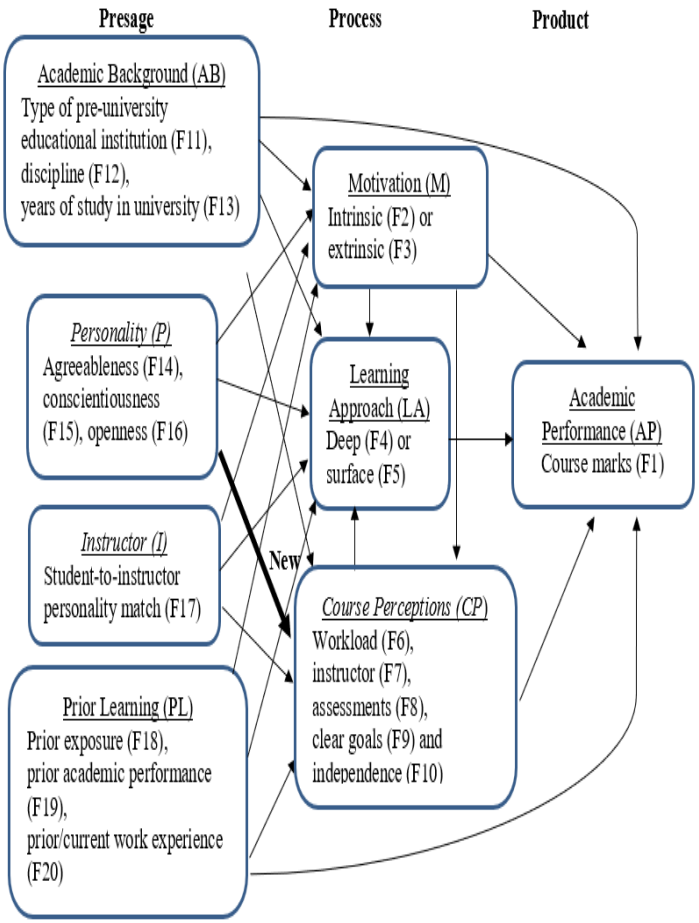

Figure 4. Final research framework based on the SEM model.

With the establishment of model generalisability and applicability, the total effects (TE), direct effects (DE) and indirect effects (IE), along with the respective p-values, are examined to better understand the nature and extent of the complex relationships among students, learning and course attributes, as well as the determinants of academic performance (simultaneously). Appendix B shows the total, direct and indirect effects along with the p-values based on the combined (January and July semesters) data.

Findings and discussion

Direct Effects on Academic Performance (H01): The SEM results show that the factors that have a positive direct effect on academic performance are: (1) deep learning approach; (2) prior exposure; and (3) prior academic performance. On the other hand, factors that have a negative direct effect are: (1) discipline; (2) number of years of study in the university; and (3) agreeableness.

The results support the notion that students in higher education should strive to develop deep learning approaches to the subject matter, such as learning through application, comparison and critique of ideas. To facilitate such developments, it is important that higher education institutions design their curriculum, assessment and pedagogies to promote deep learning. As other studies have also found (Hailikari et al., 2008; Schneider & Preckel, 2017), students with strong prior knowledge tend to be able to build on that to achieve good academic performance. As such, preparatory classes that focus on building relevant prior knowledge would likely enable students to more successfully navigate their academic learning journey in an institute of higher learning.

It is possible that students become overly confident about a particular discipline that they are already familiar with, resulting in poor performance. As such, it might be beneficial for the universities to state more explicitly the general expectations during the freshman orientation and the specific expectations during programme briefings. More years of study could indicate students' inability to adequately monitor and plan their academic progress, or that there are underlying factors affecting their ability to cope with their studies. This highlights the need to include the years of study as a predictor to identify students at risk so that interventions can be taken. The finding that more years of study than is normally expected have an impact on student performance would suggest that these students were somehow struggling to complete the programme. This could be due to a variety of reasons, including an inability to effectively plan and monitor one's academic progress. While the actual reasons for the negative impact on learning progress are unclear, the finding does point to the potential to use a slower/slowing pace of academic progress as an indicator of potential academic struggle, which the university can then verify and take steps to address.

The finding on the impact of agreeableness requires a more nuanced interpretation. In general, agreeableness includes attributes such as trust, altruism, kindness, affection, and other prosocial behaviours. While this is usually conducive to building strong interpersonal relationships, a student with a high level of agreeableness might be over-obliging and over-compliant, such that they could compromise their understanding of the subject matter by not firmly pursuing lines of questioning so as to refrain from disrupting the learning process for the class. In higher education, there is a need for students to analyse information from differing perspectives in order to form educated judgments and formulate relevant critiques (i.e., defend a disagreement with a concept). Students who are high on agreeableness might find this challenging due to their cooperative and obliging nature, which can adversely affect their academic performance. Workshops on constructive criticism and effective questioning might benefit this group of students.

Indirect Effects on Academic Performance (H02): The following factors have been found to have a positive indirect effect on academic performance: (1) intrinsic motivation; (2) perceptions of the instructor; (3) conscientiousness; and (4) openness. Students who are motivated intrinsically or have positive perceptions of their instructors are more likely to

devote more resources to their learning, leading to better academic performance. The effect of personality traits – conscientiousness and openness on academic performance is not direct, in contrast to the findings of prior studies (Komarraju et al., 2011; Vedel, 2014). In this study, it is found that these traits need to be exercised in an environment mediated by factors such as motivation, learning approach and course perceptions in order to achieve positive academic effects.

The finding that students with polytechnic education (polytechnics trained students to be practice-oriented and knowledgeable professionals to support the technological and economic development of Singapore) did not perform academically as well as their counterparts from the more academically oriented pre-university programmes such as the A-levels and International Baccalaureate speaks of the stronger alignment of university and latter's educational experiences. This would likely necessitate the provision of sufficient space and curricular structures to allow polytechnic students to adapt to university settings. For instance, providing preparatory workshops to guide students from the polytechnics on learning approaches and academic writing skills could prove to be beneficial in easing the transition from polytechnics to higher education.

Direct effects on motivation (H03): It can be concluded from the results that: (1) conscientiousness; and (2) openness have a positive direct effect on intrinsic motivation. Prior studies (John & John, 2020; Poropat, 2009) have found that personality traits of agreeableness, conscientiousness and openness were associated with better academic performance, and that intrinsic motivation was significantly and positively associated with academic performance. This study highlighted that students with higher levels of conscientiousness and/or openness are more intrinsically motivated (with openness having the higher positive direct effect), and that both traits have a positive indirect effect on academic performance. This suggests that universities can consider enhancing intrinsic motivation through cultivating a higher level of conscientiousness (such as self-discipline and planning skills) and openness (such as cultivating an open mindset).

Students who have: (1) a higher level of agreeableness; (2) conscientiousness; and (3) better prior academic performance are associated with a higher level of extrinsic motivation. Prior studies indicate that extrinsic motivation in higher education is unlikely to be sufficient for successful learning where the demand for deep understanding of the content is often required (Wu et al., 2020). Therefore, students would need to cultivate a higher level of intrinsic (rather than extrinsic) motivation to enhance their potential for better academic performance (Wu et al., 2020) and allow for greater adoption of deep learning (Ariani, 2013). The effects of extrinsic and intrinsic motivation can be highlighted through universities' student advisory.

On the other hand, students with (1) polytechnic education and (2) prior/current work experience are associated with a lower level of extrinsic motivation. The reasons for this are unclear, although the fact these students have direct experience in real-life working environment (whether through internship or employment) could indicate a useful place to examine for possible connections.

Direct effects on learning approach (H04): Students who: (1) are more intrinsically motivated; (2) have a more favourable perception of their instructor; and (3) have a higher level of conscientiousness are more likely to engage in deep learning practices. These findings are aligned with those of prior studies (Chamorro-Premuzic et al., 2007; Faranda et al., 2021). The results also show that students who have: (4) a similar personality trait as that of their instructor are more likely to use deep learning. It can be argued that these students could better relate to their instructor; hence, are more "receptive" to use deep learning to better understand the content.

On the other hand, the results show that students: (1) who graduated from polytechnics, and (2) taking a course related to their discipline are less likely to use deep learning approaches. Students who are: (1) more extrinsically motivated, and (2) who graduated from a similar polytechnic discipline, tend to use more surface learning. The findings provide a better understanding of the challenges that students from the polytechnics might face when they enter the university and could indicate that the type of pre-university educational institution that students come from has an impact on their subsequent learning experience in institutes of higher learning.

Students who are extrinsically motivated tend to focus on the successful completion of learning requirements, and surface learning is generally deemed as the more efficient way to achieve this with minimum learning effort.

On the flip side, students who are: (1) more intrinsically motivated; (2) have a more favourable perception of their assessments; and (3) have a higher level of conscientiousness are more likely to use less surface learning. These findings are aligned with prior studies (Chamorro-Premuzic et al., 2007; Lizzio et al., 2002; Tohidi & Jabbari, 2012). However, prior studies had examined these effects in isolation, while this study has analysed the effects collectively.

Indirect effects on learning approach (H05): The SEM results show that students who have a higher level of: (1) intrinsic motivation (via course perceptions); (2) openness; and (3) conscientiousness are also more likely to use deep learning (vis-à-vis surface learning via intrinsic motivation). The findings highlight the importance of intrinsic motivation and perceptions that students had of the course, making these potential handles for universities to leverage to encourage students to use more of deep learning.

Students who have a higher level of agreeableness are associated with less use of surface learning through a positive perception of assessments. Riding on this finding, universities can make explicit explanations of the purpose and learning outcomes of the assessments to help students better appreciate the assessments so that they will use less surface learning.

Direct effects on course perceptions (H06): Students who are more intrinsically motivated are more likely to have favourable perceptions of workload, instructor and assessments. These students enjoy learning for intrinsic rewards (such as a sense of satisfaction or achievement), and they might perceive the workload, instructor and assessments as guiding them to achieve their goals. In contrast, students who are more extrinsically motivated are more likely to have a less favourable perception of the workload. Students who are extrinsically motivated tend to focus on the successful completion of learning requirements and may perceive the workload as a hinderance.

Students who have a polytechnic education or have studied longer in university also have a less favourable perception of workload. These findings could reinforce the argument that there is a misalignment between the expectations in polytechnic and those in higher education, and students who have studied longer in university may have underlying factors affecting their ability to cope with their studies, leading to a less favourable perception of workload. Students who are studying a course that is related to their discipline also tend not to have a favourable perception of their instructor. Similarly, this adds to the argument that such students might be overly complacent; hence, they do not see how their instructor can aid them in their learning.

Students with better prior academic performance have more favourable course perceptions of workload and assessments. These students might have experienced similar workload and assessments that had led them to better prior academic results; therefore, they understood the benefits of the workload and assessment. On the other hand, students who have prior exposure to the content have a significant negative direct effect on the course perception of assessments. Students with prior/current work experience are associated with less favourable perceptions of their instructor and assessments. With prior exposure or prior/current work experience, these students might not comprehend how the instructor or assessments can help them gain a deeper understanding of the content.

Indirect effects on course perceptions (H07): Students with polytechnic education have a less favourable perception of assessments. This finding, along with the finding that students with a polytechnic education have a less favourable perception of workload, provides stronger evidence that the type of pre-university educational institution that students come from has an impact on their subsequent learning experience in institutes of higher learning.

Students with a higher level of agreeableness tend to adapt their perspectives to what they are faced with. This alignment process (i.e., adapting one's perspective to the circumstances) would likely be easier if they are intrinsically motivated, whereas if it is extrinsic motivation, the alignment process may face more challenges, and hence the difference in terms of favourable or unfavourable perception. Students who have a higher level of conscientiousness or openness have more favourable perceptions of workload, instructors and assessments through (intrinsic) motivation. Personality traits of students seem to work hand-in-hand with their level of motivation in influencing their perceptions of workload, instructor and assessments, especially so for personality traits – openness and conscientiousness. The findings may shed some light on why personality traits were not found to have any relation with students' perceptions of the course as motivation (which was not included in the prior studies) plays a critical role as a mediator.

Direct effect based on new paths: Results of the two new paths show that students who have a higher level of agreeableness are more likely to have more favourable perceptions of their instructor and assessments. Prior studies found no relationship between personality traits and course perceptions, although Diseth (2013) found that two course experience factors (good teaching and appropriate workload) were negatively predicted by neuroticism. However, this finding is consistent with the characteristics associated with agreeableness. Students who are high on agreeableness tend to be tolerant, kind and friendly; hence, it makes good sense for them to seek satisfactory relationships with others. Therefore, they have a more favorable perception of their instructor. Students who are high on agreeableness are also benevolent and warm, so they are more likely to be driven by affective motives. This enhances their perception of assessments.

Another new path highlights that students who have a higher level of openness have a less favourable perception of workload. Students who are high on openness are more open to trying new things. This might lead them to perceive workload as taking up too much of their time and hindering their ability to try new things. (Incidentally, this significant negative direct effect is counter-balanced by a significant positive indirect effect, leading to an insignificant total effect.)

In conclusion, all seven null hypotheses can be rejected based on the responses collected, and this provides empirical support for, or affirmation of, a number of related theoretical propositions. In addition, the new paths highlighted that the personality traits of students do have an effect on their perceptions of the course. It can be seen from the results that the relationships from one construct to another are complex.

Concluding remarks

Today, the relationships among student profiles, learning environment, course attributes and learning outcomes are central in the field of education. In this study, the Biggs 3P model was examined and expanded with reference to theories and prior studies as well as the empirical results based on this study, so as to enable a better understanding of the nature and extent of these complex relationships and the determinants that affect students' academic performance (both directly and indirectly). The examination of the effect of personality on course perceptions is made possible through the use of the expanded 3P model. Structural Equation Modelling (SEM), which allows the examination of the complex relationships among student, learning, and course attributes and academic performance, was constructed and cross-validated based on responses gathered in a local university in Singapore.

Compared to prior studies, this study uncovers:

- A more comprehensive understanding of determinants of academic performance;
- Mediation effects among the attributes and their impact on academic performance; and
- A deeper layer of understanding of the attributes and their complex interactions.

The findings are made possible in this study as the relationships between the various attributes are examined simultaneously (direct and indirect) using an expanded 3P model, which is not done in many of the prior studies. With the contributions of this study, it is hoped that institutions will be able to provide greater student support, identify appropriate interventions and design a more integrated curriculum and assessments to help students succeed academically.

Research limitations

The main purpose of this research is to determine the factors associated with academic performance in the following areas – student support, intervention and design of curriculum and assessments, so as to improve it. The generalisability of the findings may be affected by the following factors.

The learning outcome of this study is measured by the course marks of the students, which comprises only a part of the learning outcome. It is noted that learning outcomes also include aspects that are beyond the cognitive skills and abilities acquisition as measured by the course marks.

While the CEQ questionnaire asked the students for their perceptions of a particular course, the sampled students might have responded based on their perceptions of the learning environment in the university as a whole, i.e., perceptions based on all the courses that they had taken. This may confound the interpretation of the findings. Similarly, for R-SPQ-2F (Revised Two-Factor Study Process Questionnaire) and MSLQ (The Motivated Strategies for Learning Questionnaire), students might have responded based on perceptions of the learning environment in the university, among other things. In addition, the different factors that can influence students' perceptions of workload, instructors and assessments are not examined in this study. For example, the perceptions of workload, instructor and assessments can be influenced by the students' previous learning experience in their prior educational institutions.

While SEM is a powerful, multivariate technique to test and evaluate multivariate relationships, it is not without limitations. For example, although SEM can represent causal relationships (under a specific context), a well-fitting SEM does not necessarily provide information on the causal relationships. Hence, testing the fit of an SEM does not equate to a test of causality (Nachtigall et al., 2003). For this research, the relationships are examined with reference to theories and prior research. This strengthens the support for any relationships suggested by the research framework.

Compared to prior studies, this study uncovers a deeper layer of understanding of the nature and extent of the complex relationships among students, learning and course attributes, as well as the determinants of academic performance (simultaneously). It is hoped that this study can make a significant contribution to the existing literature, as well as help improve student success in universities.

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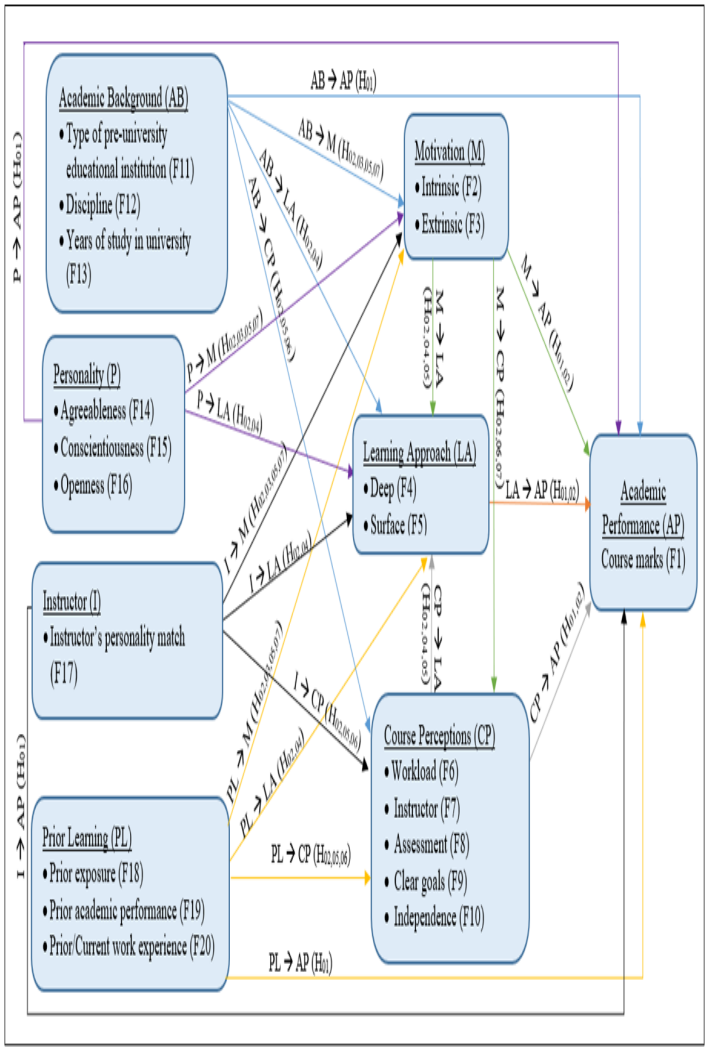
Appendices

Appendix A: The Expanded 3P Model of Teaching and Learning (Research Framework).



Appendix B: Total Effects (TE), Direct Effects (DE) and Indirect Effects (IE) with P-Values.

		H_{01} to H_{02}	H_{03}		H_{04} to H_{05}		H_{06} to H_{07} and New Paths		
		Effects On							
From		AP.FRS (F1)	M.Intrinsic (F2)	M.Extrinsic (F3)	LA.Deep (F4)	LA.Surface (F5)	CP.Workload (F6)	CP.Instructor (F7)	CP.Assessment (F8)
M.Intrinsic (F2)	TE	0.142**(0.019)	-	-	0.532*(<.0001)	-0.349*(<.0001)	0.371*(<.0001)	0.325*(<.0001)	0.247*(<.0001)
	DE	0.003(0.971)	-	-	0.486*(<.0001)	-0.212*(0.005)	0.371*(<.0001)	0.325*(<.0001)	0.247*(<.0001)
	IE	0.139*(0.008)	-	-	0.046***(0.084)	-0.137*(0.001)	-	-	-
M.Extrinsic (F3)	TE	0.033(0.478)	-	-	-0.013(0.309)	0.18*(0.001)	-0.184*(0.002)	-0.018(0.715)	0.092(0.111)
	DE	0.048(0.333)	-	-	-	0.214*(<.0001)	-0.184*(0.002)	-0.018(0.715)	0.092(0.111)
	IE	-0.016(0.430)	-	-	-0.013(0.309)	-0.035(0.262)	-	-	-
LA.Deep (F4)	TE	0.176**(0.013)	-	-	-	-	-	-	-
	DE	0.176**(0.013)	-	-	-	-	-	-	-
	IE	-	-	-	-	-	-	-	-
LA.Surface (F5)	TE	-0.088(0.168)	-	-	-	-	-	-	-
	DE	-0.088(0.168)	-	-	-	-	-	-	-
	IE	-	-	-	-	-	-	-	-
CP.Workload (F6)	TE	0.007(0.908)	-	-	-	-0.052(0.389)	-	-	-
	DE	0.002(0.972)	-	-	-	-0.052(0.389)	-	-	-
	IE	0.005(0.466)	-	-	-	-	-	-	-
CP.Instructor (F7)	TE	0.057(0.303)	-	-	0.221*(<.0001)	-	-	-	-
	DE	0.018(0.748)	-	-	0.221*(<.0001)	-	-	-	-
	IE	0.039**(0.052)	-	-	-	-	-	-	-
CP.Assessment (F8)	TE	0.057(0.387)	-	-	*-0.104(0.101)*	-0.477*(<.0001)	-	-	-
	DE	0.033(0.671)	-	-	*-0.104(0.101)*	-0.477*(<.0001)	-	-	-
	IE	0.024(0.485)	-	-	-	-	-	-	-

		H_{01} to H_{02}	H_{03}		H_{04} to H_{05}		H_{06} to H_{07} and New Paths		
		Effects On							
From		AP.FRS (F1)	M.Intrinsic (F2)	M.Extrinsic (F3)	LA.Deep (F4)	LA.Surface (F5)	CP.Workload (F6)	CP.Instructor (F7)	CP.Assessment (F8)
AB.PreUType (F11)	TE	-0.103**(0.013)	-0.055(0.255)	-0.114**(0.015)	-0.103**(0.020)	0.181*(<.001)	-0.105***(0.054)	-0.016(0.341)	-0.106**(0.041)
	DE	-0.059(0.168)	-0.055(0.255)	-0.114**(0.015)	-0.083**(0.043)	0.138*(0.003)	-0.105***(0.053)	-	-0.082(0.117)
	IE	-0.044*(0.01)	-	-	-0.019(0.479)	0.044(0.171)	0(0.989)	-0.016(0.341)	-0.024***(0.098)
AB.Disc (F12)	TE	-0.108**(0.012)	0.047(0.354)	0.063(0.189)	-0.078***(0.095)	-0.067(0.180)	0.017(0.764)	-0.116**(0.012)	0.019(0.719)
	DE	-0.102**(0.020)	0.047(0.354)	0.063(0.189)	-0.073***(0.089)	-0.061(0.196)	0.011(0.842)	-0.13*(0.004)	0.002(0.971)
	IE	-0.006(0.894)	-	-	-0.005(0.874)	-0.007(0.832)	0.006(0.782)	0.014(0.403)	0.017(0.215)
AB.StudyYears (F13)	TE	-0.161*(<.0001)	0.04(0.417)	-	0.021(0.635)	-0.03(0.534)	-0.114**(0.033)	0.044(0.330)	0.015(0.770)
	DE	-0.169*(<.0001)	0.04(0.417)	-	-0.006(0.878)	-0.02(0.662)	-0.128**(0.017)	0.031(0.482)	0.005(0.916)
	IE	0.008(0.559)	-	-	0.028(0.321)	-0.01(0.745)	0.015(0.424)	0.013(0.421)	0.01(0.426)
P.Agreeableness (F14)	TE	-0.13*(0.006)	-	0.119**(0.044)	0.049(0.340)	-0.16*(0.006)	-0.022***(0.088)	0.389*(<.0001)	0.416*(<.0001)
	DE	-0.170*(0.004)	-	0.119**(0.044)	0.007(0.918)	0.012(0.854)	-	0.391*(<.0001)	0.405*(<.0001)
	IE	0.049(0.189)	-	-	0.043(0.248)	-0.172*(<.0001)	-0.022***(0.088)	-0.002(0.723)	0.011(0.192)
P. Conscientiousn (F15)	TE	0.079*(<.001)	0.223*(<.0001)	0.161*(0.01)	0.303*(<.0001)	-0.154**(0.011)	0.053***(0.075)	0.07*(0.002)	0.07*(0.001)
	DE	-	0.223*(<.0001)	0.161*(0.01)	0.187*(<.001)	-0.105***(0.09)	-	-	-
	IE	0.079*(<.001)	-	-	0.116*(<.001)	-0.049***(0.084)	0.053***(0.075)	0.07*(0.002)	0.07*(0.001)
P.Openness (F16)	TE	-0.023(0.645)	0.433*(<.0001)	0.004(0.942)	0.285*(<.0001)	-0.039(0.493)	-0.1(0.116)	0.141*(<.0001)	0.107*(<.001)
	DE	-0.084(0.181)	0.433*(<.0001)	0.004(0.942)	0.055(0.351)	0.098(0.146)	-0.26*(<.0001)	-	-
	IE	0.061***(0.076)	-	-	0.23*(<.0001)	-0.137*(0.001)	0.16*(<.0001)	0.141*(<.0001)	0.107*(<.001)
I.InstPerMatch (F17)	TE	0.043(0.302)	0.029(0.563)	0.068(0.149)	0.082***(0.075)	0.012(0.691)	-0.002(0.967)	-0.053(0.246)	-0.007(0.895)
	DE	0.028(0.511)	0.029(0.563)	0.068(0.149)	0.079***(0.06)	-	0(0.994)	-0.061(0.171)	-0.02(0.690)
	IE	0.016(0.207)	-	-	0.003(0.915)	0.012(0.691)	-0.002(0.929)	0.008(0.623)	0.013(0.330)

		H_{01} to H_{02}	H_{03}		H_{04} to H_{05}		H_{06} to H_{07} and New Paths		
		Effects On							
From		AP.FRS (F1)	M.Intrinsic (F2)	M.Extrinsic (F3)	LA.Deep (F4)	LA.Surface (F5)	CP.Workload (F6)	CP.Instructor (F7)	CP.Assessment (F8)
PL.PriorExp (F18)	TE	0.081***(0.051)	0.05(0.312)	-	0.098**(0.031)	0.03(0.302)	0.018(0.742)	0.002(0.970)	-0.087***(0.087)
	DE	0.069***(0.098)	0.05(0.312)	-	0.064(0.124)	-	-0.001(0.991)	-0.015(0.746)	-0.1**(0.052)
	IE	0.012(0.347)	-	-	0.034(0.241)	0.03(0.302)	0.019(0.321)	0.016(0.318)	0.012(0.327)
PL.PriorAcadPerf (F19)	TE	0.36*(<.0001)	0.011(0.831)	0.207*(<.0001)	-0.039(0.388)	0.019(0.702)	0.073(0.183)	0(0.992)	0.12**(0.023)
	DE	0.355*(<.0001)	0.011(0.831)	0.207*(<.0001)	-0.031(0.451)	0.038(0.43)	0.107***(0.055)	-	0.098***(0.069)
	IE	0.006(0.737)	-	-	-0.007(0.796)	-0.019(0.575)	-0.034(0.148)	0(0.992)	0.022(0.217)
PL.WorkExp (F20)	TE	0.027(0.533)	-0.043(0.403)	-0.088***(0.069)	-0.053(0.257)	0.002(0.972)	0(0.988)	-0.131*(0.005)	-0.132**(0.013)
	DE	0.048(0.282)	-0.043(0.403)	-0.088***(0.069)	-0.017(0.695)	-0.052(0.284)	-	-0.119*(0.009)	-0.114**(0.033)
	IE	-0.021(0.200)	-	-	-0.036(0.236)	0.053***(0.1)	0(0.988)	-0.012(0.473)	-0.019(0.197)

* = significant at a .01 significance level
** = significant at a .05 significance level
*** = significant at a .10 significance level

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Growing (up) at work: Industrial placements and soft skill development among business students

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Abstract

This paper offers an analysis of soft skill acquisition and development in the context of work placements, using a series of semi-structured interviews to offer a qualitative exploration of the placement experiences of business students. The paper chooses as its focus five key soft skills sought by graduate employers: 1) communication, 2) teamwork, 3) problem-solving, 4) time management and 5) creativity, and examines their development in the placement context. It highlights the benefits of work placements while acknowledging limitations and impediments. Recommendations for students, universities and placement employers are offered.

Introduction

Britain's Higher Education Institutions (HEIs), while formally independent charitable organisations, are nonetheless beholden to a complex of agencies and regulatory bodies. In recent years, this regulating patchwork has obliged universities to develop policies, processes and structures designed to foster social goods such as employability and 'impact'. To ensure that these goods are pursued with the necessary vigour, universities are now ranked by a variety of bodies (including the news media) according to their research performance, their 'graduate outcomes', and the extent to which they offer enriching curricula (Peretomode, 2021; Vernon et al., 2018), including rankings such as the Teaching Excellence Framework (SI-UK, n.d.), The Research Excellence Framework (n.d.), as well as the rankings created by The Complete University Guide (2025) and *The Times* (2025). In addition, Britain's universities are expected to widen access to higher education opportunities and are, consequently, expected to participate in social engineering initiatives, offering for example 'contextual offers' to students from those postcodes that are said to be under-represented in higher education (see Burrell et al., 2024; Christie, 2016). Taking this context into account, this paper will offer reflections on the development of employability among undergraduate business students. Our central focus is the acquisition and development of 'soft skills' within (and beyond) the curriculum. These skills constitute our central focus because they are, as we shall see, routinely reported by graduate employers as the key characteristics sought of recruits. To explore these soft skills in a fashion that might allow students, employers and indeed institutions of higher learning a) to reflect upon their character and b) to foster their acquisition and development, we offer a study of the experiences of business students who have recently undertaken a period of work placement.

It is important to note that graduate skills exist and are exercised within contexts marked by dynamism. For example, the World Economic Forum (2025) usefully reminds us that constant changes within technology; the growing use of artificial intelligence, economic uncertainty and greater focus on environmental issues all pose significant challenges, which current and future graduates will be obliged to address. Or perhaps more plainly, graduates within this setting will have to be flexible and adaptable. They will need to think creatively, communicate clearly and work as part of a team even as they commit to a process of life-long learning. Building upon this, Fadhil (2023) adds that to flourish within the workplace, employees require a dynamic-grit mindset. This mindset, they observe, condenses to being engaged and finding meaning in work, regularly upskilling and developing competencies, being resilient, maintaining positive professional relationships, as well as being emotionally intelligent and a good problem-solver. Whilst Fadhil's study focuses on older workers, he does suggest that this mindset is crucial for workers of all ages and cultures, allowing them to flourish and preparing them to tackle new challenges effectively. Vriend et al. (2025) highlight the mental health challenges that workers face in these dynamic contexts. Indeed, they observe that more than 10% of the working-age people have reported poor mental health. They also observe that the issue is particularly prevalent among those aged between 16 to 34. Interestingly, the World Health Organization (2024) highlights that poor mental in the workplace occurs, often as a result of discrimination, poor work conditions or heavy workloads, but also may also impact those who are either under- or over-skilled for their jobs.

It is important to concede, however, that while many now highlight the importance of soft/ graduate skills in employment, it is often difficult to secure a detailed consensus on the precise nature and categorisation of 'soft skills' in this context. Within this journal, for example, Clough et al. (2020), while acknowledging the centrality of leadership and teamwork, would argue for the inclusion of reflexivity and cultural awareness as key graduate attributes. Similarly, Damasevicius (2024), while discussing the educational implications associated with the development of generative AI, would tend to argue for the inclusion of resilience and ethical judgement as key graduate skills. Likewise, Ng et al. (2024) choose to highlight resilience *as well as* learning agility and social adaptability as the keys to both employability and productivity. Meanwhile, Rudolph et al. (2023), while endorsing much of the foregoing analysis, usefully remind us that notions of employability tend to vary with our understanding of the very nature of work and indeed its intrinsic worth and merit. Sketching a range of possible futures consequent upon the ongoing development of large language computer models, Rudolph and his colleagues suggest that the use of generative AI in the workplace may call for heightened social and interpersonal skills for a knowledge elite while rendering others surplus to the needs of the commercial economy.

This paper, while acknowledging this debate as to the essential nature of soft skills, will focus attention upon five key attributes that are consistently highlighted as being central to graduate employability. These are communication, teamwork, time management, problem-solving and creativity (see Carroll, 2013; Menon, 2018; World Economic Forum, 2016; Zety, 2022).

Our study, as we shall see, builds upon current studies concerned with graduate employability and soft skill development (see Brooks & Youngson, 2014; Hossain et al., 2020; Jackson, 2014; Jackson & Wilton, 2016; Mainga et al., 2022; Succi & Canovi, 2020). These studies inform our analysis, of course, yet they are largely quantitative in approach and emphasis. We depart from this quantitative tradition. We offer instead a qualitative analysis of the acquisition and development of soft skills. This qualitative approach is distinctive and, we suggest, useful because it allows us to generate insights around growing (up) at work, which we hope will assist students, universities and graduate employers in their efforts to improve employability.

Accordingly, the remainder of this paper is structured as follows. Section two will review recent literature on graduate employability and soft skill development. Acknowledging that skill development (for employability) is experiential in nature, we will preface our reflections on the development and acquisition of soft skills in the workplace by acknowledging the contribution of Kolb (2015). Section three will offer an outline of the methodology underpinning

our study, while section four will present core findings. These findings, as we shall see, build upon our earlier discussion of Kolb and in so doing offer brief reflections on the way participants located their placements and pursued their learning. Having secured this understanding, we will then turn to offer a more detailed account of the acquisition and development of those soft skills, highlighted above. Finally, the paper will conclude with recommendations designed to maximise the opportunities for students and universities that are (too often) latent in work placements.

Literature review

An overview of graduate employability

The concept of employability self-evidently implies that those who are in employment possess and exercise the skills and capabilities necessary to secure and to retain their positions. It will be helpful in this context, however, to unpack this concept. Indeed, it may be useful to observe that those deemed 'employable' possess and exercise a mixture of a) technical (or hard skills), b) non-technical competencies (or soft skills), c) demonstrable academic performance and d) labour market awareness (Mainga et al., 2022; Hossain et al., 2020; Kornelakis and Petrakaki, 2020). In combination, this collection of knowledge and skills is important for employability because they allow individuals to enter and to move successfully within the labour market (Clarke, 2017; Jackson, 2013; Tentama & Merdiaty, 2020). Commenting upon this marketplace, Clarke (2017) observes that employers expect graduates to be work-ready and capable of making an immediate contribution when they first enter employment. This understanding, of course, implies that graduates must be ready – on entry to the workplace – to utilise technical knowledge, work-related competencies and relevant soft skills. Soft skills are increasingly recognised as being paramount in this context. Indeed, over half of senior leaders recently surveyed are said to value these above role-specific and/or industry-related theoretical knowledge or 'hard skills' (Petrone, 2018; Salas-Velasco, 2021).

Soft skills can be developed within the university curriculum, for example, through group work and project work. We should acknowledge, too, that sporting endeavours may also foster soft skills (De Prada et al., 2022). Nonetheless, there are barriers to soft skill acquisition and development in classroom settings. These limitations include (but are not limited to) simple disengagement, poor motivation, social anxiety and, of course, the extent to which university curricula build and depend upon formal, theoretic and/or more esoteric forms of knowledge (Gratton, 2020; Hassall et al., 2005; Srenivasulu & Kumar Jha, 2020).

Elaborating upon this issue, Bunga Noah and Aziz (2020) suggest that student resistance to soft skill acquisition and development within their formal studies is a key impediment to the development of employability. Indeed, the authors report that students often choose to focus upon the acquisition of academic knowledge and the pursuit of good grades, on the assumption that these will be sufficient to secure well-paid, graduate positions. Mallard (2012; see also the High Fliers Research, 2019), however, reminds us that soft skills and hard skills must be acquired concurrently and not consecutively if students are to secure positions that genuinely reflect their educational attainment and future potential. Indeed, Mallard (2012) observes that while recruiters recognise the very clear virtues of a degree education, they are increasingly reluctant to hire candidates who lack prior work experience. Brooks and Youngson (2014) add to this discussion. They remind us that graduates are now expected to possess relevant skills and experience in addition to their academic qualifications and observe that these supplementary elements differentiate graduates in a congested labour market. Building upon this, Jackson (2014) argues that the additional year in education associated with an extended work placement must be recognised, not as an additional cost, but as an investment in soft skill formation, which will launch and advance genuine graduate careers.

Echoing this, Vecchi et al. (2021; see also Salas-Velasco, 2021) note that a lack of work experience often prevents graduates from obtaining positions appropriate to their level of education, encouraging them to accept lower positions as they attempt to gain the skills which employers expect of their graduate employees on entry. It will be useful now to reflect further upon these soft skills.

The term 'soft skills' refers to a wide group of social skills, attributes and behaviours used across personal, academic and professional life (De Prada et al., 2022). Hard skills are often defined as industry-specific knowledge and are acquired largely through formalised systems of education and training (Singh & Kumar, 2010). These hard skills are emphasised within educational contexts because they are used (most obviously) to pass knowledge and competence-based tests (Armstrong Melser, 2022). De Prada et al. (2022), however, insist that soft skills must be regarded as, at least, complementary to hard skills when employment opportunities are considered. Indeed, Petrone (2018), amongst others (see, for example, Clough, 2020; Waring, 2024), suggests that the ongoing development of AI places an additional premium on soft skills since these are, presently, difficult for computer systems to mimic. Adding to this discussion, Rudolph et al. (2023) remind us that developing large language computing models raises educational and ethical issues for educators. They observe, for example, that future users of generative AI will need to learn what and how to ask these models in order to ensure that they genuinely contribute to knowledge and understanding.

Turning to the barriers that may impede the acquisition and development of soft skills, we should concede that these include outdated curricula and resistance among students and faculty alike (Srenivasulu & Kumar Jha, 2020). Social anxiety, language barriers, discrimination and a tendency to stereotype are also acknowledged as barriers to soft skill acquisition and development (Hassall et al., 2005; Rani Kumbakonam, 2016). Gratton (2020), however, argues that the contemporary, research-driven curriculum is a significant, if overlooked issue in this debate. This focus upon research, he suggests, crowds out other learning opportunities within the curriculum and leaves little room for activities supporting soft skill development.

Inviting further reflection on the nature of these soft skills, Zety (2022; see also Carroll, 2013; Menon, 2018; World Economic Forum, 2016) argues that teamwork, communication, time management, problem-solving and creativity constitute the core skills now sought by graduate recruiters. Furthermore, we should acknowledge that these skills are crucial not only to business graduates but also within other fields, such as healthcare (Sancho-Cantus et al., 2023; Efthymiou, 2024; Ofori-Manteaw et al., 2025), education (Karras, 2022; Tang, 2018), social work (Rusanova, 2025), design (Jung & Suh, 2024; Ibrahim & Abiddin, 2024) or even engineering (de Campos et al., 2020; Munir, 2021).

Acknowledging the tension between the curricular focus upon research and the development of soft skills, Succi and Canovi (2020) and Nghia (2019) suggest that placements and internships must now be viewed as the key engines for the development of those skills which graduate recruiters truly value. Accepting this point, Vorreyer and Miller (2015; see also Jackson, 2014) nonetheless issue a warning. Successful soft skill acquisition and development within placement contexts, they argue, will require students to actively participate in practice, feedback and reflection. This understanding suggests that we might usefully pause to reflect upon Kolb's (2015) account of experiential learning.

Experiential learning

Kolb (2015, p. 13) defined experiential learning in the context of education as "a particular form of learning from life experience". This approach he contrasts with "lecture and classroom learning". Experiential learning can occur both within and outside the classroom, including internships, work placements, apprenticeships, student exchanges and research projects (Jackson, 2013). Chan (2022, p. 6) expands on this and in so doing chooses to highlight group work, case studies, presentations, role plays and debates. These activities, she reveals, constitute "pedagogies for active learning", which actively promote soft skill development.

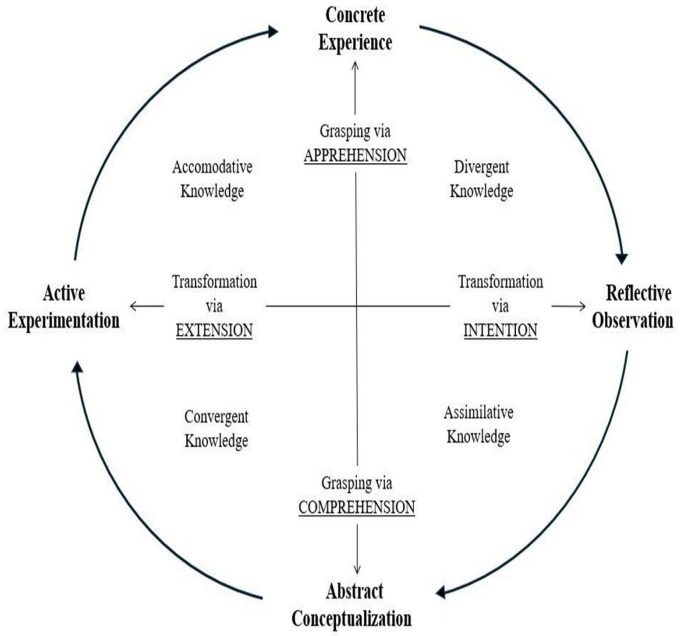

Figure 1. Kolb's Experiential Learning Cycle. Adapted from Kolb (2015, p. 59).

Kolb's (2015) account of experiential learning (ELT) consists of four stages (see Figure 1). Indeed, he suggests that useful learning processes are cyclical. In this context, effective learning is taken to build upon concrete experience, reflective observation, abstract conceptualisation and active experimentation. Initially, Kolb suggested that each individual will have a preferred way of learning and presents four, broad learning styles, which may be summarised as diverging (feeling and watching), assimilating (watching and thinking), converging (doing and thinking) and accommodating (doing and feeling) (see Johns, 2001; Kolb & Kolb, 2009).

Kolb's ELT is one of the most widely accepted theories on experiential learning and has been applied by many researchers (Johns, 2001; Long & Gummelt, 2019). However, it has also been subject to criticism. Truluck and Courtenay (1999), for example, suggest that learning styles vary with age and suggest that individuals move from practical to reflective learning styles as they mature. Responding to this criticism, Kolb (2015), as we hinted above, has conducted further research, which highlights flexibility in learning with individuals adopting different styles depending on the context. Pursuing an alternative line of critique, Reynolds (1999) suggests that greater emphasis should be placed on critical theory and reflexivity in the context of learning. This critique challenges the importance which Kolb (2015) places on reflective observation. Indeed, Reynolds (1999) suggests that critical reflection has greater value than reflective observation. The former, he argues, is important because it encourages the learner to recognise those societal influences that tend to normalise hegemonic, limiting assumptions.

Taking a different tack, Cuevas (2015) complains that there is little empirical evidence to support the validity of experiential learning. Countering this, however, Manolis et al. (2013) observe that many educators have, in fact, used Kolb's ELT to design courses and activities. Indeed, Manolis et al. (2013) protest that these ELT-informed programmes plainly meet the needs and preferences of learners (see also Kolb, 2015; McCarthy & McCarthy, 2006). Furthermore, they suggest that Kolb's model improves learning and develops feelings of empowerment because it provides the encouragement critical in enabling learners to identify and to apply their preferred style (see also Healey & Jenkins, 2000). Howard (2020) situates this learning process. He argues that Kolb's model is powerful in the context of employability initiatives because it encourages the learner to put theoretical knowledge into practice, highlighting the importance of reflection.

In short, the theoretical approach developed and advanced by Kolb (2015) has both merit and utility for our discussion of placements, soft skills and employability, because it makes a clear link between knowing and doing. Yet if we are to secure this rationale (and our findings), we must first offer an account of the methodological choices that underpin our analysis and our broader recommendations.

Methodology

Qualitative primary data was collected using semi-structured interviews to understand the impact of industrial placements on soft skill development among business students. This approach, as we noted earlier, contrasts with the extant literature, which is predominantly quantitative in nature. Participants were drawn from a range of degree courses, including Human Resource Management, Logistics and Supply Chain Management, and Tourism and Events Management, and had completed their placements in a variety of organisational settings, including HR, Sales, Marketing, Events Management and Finance, both within the public and the private sector.

The research was conducted in line with the approach expected for ethical research practices. Prior to the commencement of the research, ethical approval was obtained from the University's ethics committee. Participants were provided with a detailed outline of the project, and written consent for participation and subsequent dissemination was sought and secured from each participant. In total, 12 face-to-face interviews were conducted. Initially, these interviews focused on how participants secured their placements before considering their soft skill acquisition and development. Each participant had completed or was currently completing their placement when the interview was conducted. All participants were students at the same Higher Education Institution, located in the north of England. The interviews took place in Autumn 2023 and lasted on average around an hour, with the shortest being 42 minutes and the longest 94 minutes. The outline interview schedule was shared with the participants before the interview to enable preparation and reflection, although each was also made aware that additional, follow-up questions would be asked during the encounter.

The interviews were audio-recorded and auto-transcribed, with each transcript being checked for accuracy following the interview. This approach allowed the researchers to become familiar with the data. It facilitated the development of initial manual coding, which was informed by the thematic approach outlined by Braun and Clarke (2006). Each soft skill discussed previously was recognised as a theme (alongside other themes such as previous work experience or learning preferences) and then divided according to the codes assigned. In keeping with the guidance of Spiers et al. (2018), the authors discussed their initial reflections on the themes and codes assigned. Following this discussion, a further round of coding was undertaken to ensure that the codes were plausible and properly reflective of the ideas and orientations shared by the participants.

Findings and discussions

Employability among students

Tentama and Merdiaty (2020) argue that employability is important for effective career management and should be addressed by educators. Our findings show that the students' university does aim to develop employability and soft skills within the curriculum through activities like group work, presentation tasks and consultancy projects often brokered with the assistance of a range of external clients. However, the participants observed that theory and hard-skills development continued dominating their programmes and suggested that this focus had done little to boost their employability, which supports Mainga et al.'s (2022) findings. That said, a minority of our participants did observe that some of the hard skills acquired had proved helpful in the context of their placements:

> But there are certain modules that I think were a lot more useful like we did an HR law module. And that I actually used, and I knew things going into my placement, that was useful for that, especially when like, we give advice to managers and stuff. (P7)

De Prada et al. (2022) highlight the importance of extracurricular activities in developing employability and soft skills among students. Our findings confirm this and show that participants who undertook extracurricular activities found these useful as a means of a) developing soft skills like teamwork, communication, and creativity and b) demonstrating this to placement recruiters. Those who had not participated in extra-curricular activities suggested that they had found it difficult to find pastimes that matched their interests and/or inclinations. Others, perhaps more honestly, simply acknowledged that they had little real inclination to participate in extra-curricular activity. That said, it may be useful to observe that we have been unable to ascertain the extent to which this non-participation amounts to a genuine choice or is, in fact, a product of social exclusion and/or larger social anxieties.

For most participants, the placement constituted their first experience working in an office setting or a role related to their degree. Mallard (2012) suggests that work placements related to study periods are useful in the context of Higher Education because they utilise theory through practice, improving hard and soft skills in tandem. Not all participants, however, shared this viewpoint. That said, we should note that those who struggled to utilise theory through practice conceded that this outcome arose partly because they had accepted placements which had only a tangential relation to their studies.

Mallard (2012) also reminds us that placements may help individuals to decide on a career path. Our interviews suggest that, through their placement experience(s), participants had indeed formed a better idea of their desired career path. It may be useful to observe, however, that this understanding was sometimes couched in the negative since a proportion of our interviewees acknowledged that they now knew which paths they would definitely not follow post-graduation. Those who had had more positive placement experiences, however, often stayed on in part-time roles post-placement or were offered the promise of a return to a graduate position on completion of their studies.

Developing soft skills through on-the-job learning

Our study identified benefits and barriers to developing soft skills within a university setting. Most participants agreed that seminars and group projects had helped them learn how to collaborate with others; to resolve problems and to work towards shared goals, reflecting the examples and benefits of classroom-based experiential learning outlined by Chan (2022). However, applying those skills at university differed from on placement, where greater levels of formality and professionalism were required. Commenting upon the limitations of their university experience, one participant, for example, captured the essence of the problem, observing that:

> No one was really much interested in them (group projects). Everyone's just interested in getting a grade from them. So, though I think in theory they develop those soft skills, I think if you actually look at it in practice, they don't do much because people barely talk. You put the PowerPoint presentation together the night before and then try and pretend like y'all know each other and present it. (P2)

Participants typically reported that their confidence had improved thanks to their placement experience. Commenting upon this, Singh and Kumar (2010) and Salas-Velasco (2021) remind us that soft skills are especially significant for graduates because so many find themselves working in fields where the hard skills that were central to their curricula simply do not apply to any meaningful extent. Some participants rationalised this outcome by offering a comparison to the technical systems they had used on placement, noting that while such systems are dynamic and are of course subject to periodic revisions, the application of soft skills would remain consistent throughout their careers.

On-the-job learning is, of course, a form of experiential learning, which can be explored through the stages and learning styles presented in Kolb's (2015) ELT. In our study, all participants agreed that they learn best by doing, although most did concede that prior exposure to 'theory' could offer a useful basis for practice. The preferred practice methods, however, differed across participants. Some, for example, were keen to practise their skills from the outset, whereas others preferred to observe and then replicate. Interestingly, one participant advocated periodic blocks of segmented training because they found initial attempts to train them on all aspects of the role to be both ineffective and overwhelming:

> And then obviously, trying to initially do the whole job role at once you feel shaky and then it's harder and a slower process rather than… And that's something I did tell them because I was, especially, I think bad at picking it up and they changed the process. So, when they trained the next intern, they did do it in block training. (P10)

As we noted earlier, Truluck and Courtenay (1999) have criticised ELT for its failure to recognise that learning styles may change over time. Kolb (2015), however, has subsequently addressed this criticism, undertaking further research, which concedes that individuals may indeed adapt their learning styles based on the learning context. In our study, changes in learning styles were apparent. Interestingly, some noted a tendency to switch learning styles as they moved between the university and the workplace.

Reflection, as Kolb (2015; Howard, 2020) makes clear, is vital for the learning process. Whilst the participants recognised the value of reflection, most undertook this activity only because it was expected and assessed by the university and/or their placement employer. Additionally, most participants agreed that they rarely reflect on their own initiative and would only address this important element of the learning cycle if they lacked motivation or encountered an especially challenging situation. However, a minority of our participants stated that they had, themselves, chosen to engage in reflective activities albeit in less formal and/or rigorous ways than advocated by Kolb (2015; Kolb & Kolb, 2009):

> I think if I wasn't at university then like the need for reflection, I probably wouldn't think about it too much and stuff. I think everyone naturally reflects on their experiences anyways, though, when thinking back to something, and especially when you need to use examples and scenarios and for interviews and stuff. (P4)

Reynolds (1999), as we have seen, has criticised Kolb's use of reflective observation. Advocating a more critically reflexive account of learning, Reynolds (1999) argues that individuals (especially those from more disadvantaged groups) must work hard to understand societal stratifications and hierarchies. In our interviews, we encountered elements of this critically reflexive activity, especially when discussing culture and hierarchy. This finding is interesting because it suggests that our participants employed learning strategies in a fashion that was genuinely mindful of what Collins (2021) terms "the profane realities of the workplace".

Communication

Prior to their placements, our participants had all either secured some employment experience; had participated in sporting activities; had volunteered to some degree and/or had engaged in group projects associated with their studies, all of which promote soft skill development, as discussed by De Prada et al. (2022). All noted, however, that their placements had obliged them to rethink and to develop further their communication skills and strategies:

> I did struggle a bit at the beginning, especially with talking with managers, you know, they are people who have more power than you within the organisation. So, I was easily getting stressed, whether it was talking with them on Teams or responding to their emails. (…) But, as I progressed through the placement, as I had more experience with it, I was doing it daily, so a lot of experience… So, in the later stages of my placement, I was more comfortable talking with those people. (P9)

Most participants confided that as they commenced their placements, they often felt wary about asking for help and guidance from colleagues. This is, we suggest, especially problematic because, by their own admission, most participants doubted their ability to complete routine tasks to a professional standard. For example, most doubted their ability to compose suitable email communications. In addition, one participant struggled initially due to more fundamental language barriers. All of our participants, however, reported improvements in their communication practices, partly due to building relationships with their co-workers.

Those who worked remotely (due to COVID restrictions in the main) initially struggled with online communication and reported frequent misunderstandings and miscommunications. However, these problems eased as the participants developed working relationships or, as lockdowns eased, could work in the office setting. Post-placement, the participants reported that they felt more confident with the different types of communication and reported that they had developed a range of communication strategies, which they were able to deploy depending upon context. Our participants found feedback very motivating and used this feedback as a useful guide for further improvement. That said, many also expressed a desire for more feedback and more networking opportunities between different departments or levels of staff.

Teamwork

Most participants had some prior experience of teamwork, developed through previous employment or team sports. Throughout the placement, the participants found teamwork to be crucial to the successful execution of their roles. Asked to explain how this skill had developed, our participants typically reported that they had developed their teamworking skills by learning to ask for help when resolving issues; by helping colleagues to complete tasks and – of course – by participating in team-building exercises. Even those engaged in tasks marked, apparently, by independent responsibilities, found teamwork to be an important component of their roles and chose to draw attention to situations when/where they had been given opportunities to work with others to generate new ideas and approaches:

> I do prefer doing my tasks individually as it allows me to focus more on the task and what needs to be done. But I think the brainstorming part, discussing new ideas, discussing how the project is going, asking for support. I think that part of teamworking, I really enjoy. (P9)

One participant, however, suggested that such meetings should be programmed more regularly, and indeed suggested that these might be scheduled after each event or project to improve group reflection and team building:

> So, I believe there should be kinda like a meeting, for example, after every single event where we discuss "this went wrong, this went amazing" and, for example, based on the things that went wrong, maybe draw some conclusions. (P3)

Problem-solving

Pre-placement, most participants felt that in their lives, they had had few serious problems to address and therefore reported that their problem-solving skills were limited. Throughout the placement, however, the participants developed their problem-solving skills, although largely by trial and error, for example, by identifying and resolving queries or system errors on an ad hoc basis. Most also acknowledged that they depended upon the support of their colleagues as they worked to develop their own problem-solving skills. Although the participants initially felt nervous when confronted with problems, each reported that they had gained confidence with practice and, what is more, felt a significant sense of achievement whenever they successfully solved a problem.

After the placement, the participants expressed greater confidence in their problem-solving abilities. Indeed, most noted that their approach had become more analytical and less dependent upon intuition:

> So, it's definitely developed how I prepare to problem solve and how I walk into something and go, "Okay, what do I already know that I can apply to solving this problem?". It's not like just flapping my arms around and being stressed. It's more of going, "What do I already know? What can I apply to this? What's the best way of solving it?". (P11)

To develop these problem-solving skills further, some participants suggested that it would have been desirable to gain experience across business areas, and argued that it would be helpful in this context to participate in cross-departmental work and/or simulation exercises. Interestingly, some suggested that they would have appreciated what might be termed a stepped approach to learning, designed to increase their exposure to more challenging issues as their placement developed over time:

> Maybe more challenging projects, by the end of the placement, because in the beginning, it was really challenging, but then when I learned all of that stuff, it really didn't go beyond that level of challenging. (P9)

Time management

Before the placement, most participants suggested their time management skills were somewhat limited. One participant, for example, confided that their time management capabilities had developed largely as a result of playing for a football team. This commitment, she observed, had taught her how to structure her time around the obligations associated with her training sessions and matches.

The core time management issues that participants faced on placement included a) distractions when working remotely and b) receiving considerably higher workloads than previously experienced or anticipated. These new expectations were reported as being stressful initially, although this feeling reduced as time management strategies were developed and applied. In this context,

participants reported the adoption of various tools and techniques, including using their calendar, making to-do lists or 'timeboxing'. Our participants demonstrated a level of maturity in this regard, observing that time management was crucial because it allowed them the necessary flexibility to accommodate those unexpected tasks which tend to arise throughout the course of the normal working day. Interestingly, one participant chose to enlist the help of a more experienced colleague to understand how tasks should be prioritised:

> Well, I got someone who was more efficient than me doing the tasks to make a list of the order they do them and because it turned out there was things that I was prioritising, which didn't need to be done then. But there were things that needed to be done, and they'd get pushed back because there's ones that didn't actually need prioritising. (P10)

Following the placement, most stated they had a more structured approach to managing time and assignments, as compared to their previous years at university. It is almost unnecessary to add that improved time management reduced stress.

Creativity

Only some participants considered themselves creative. Indeed, those reporting this skill tended to be that small minority of our participants who enjoyed pastimes, such as photography or the performing arts. For most participants, creativity was not considered to be a crucial part of their role. The exception was limited to those working in Marketing, who voiced the belief they had more opportunities to be creative as compared to those in HR or Finance:

> I was developing a reward programme, where they went "It's unlimited reign," and I went "Brilliant. Let's be creative". And then I promptly got told "We didn't mean unlimited reign. We meant unlimited reign in the bureaucratic sense of "it can be that or that but you get to choose which". And I was like, "Right, okay, this isn't the same as what I mean as creative". (P2)

One participant who had worked as a data analyst, however, suggested that they had developed creativity skills by learning how to present data and by being allowed to develop solutions to client problems:

> So, I think it was creativity more in the sense of coming up with original solutions to a problem, you know, so every request, every project, it was different. It was a different data set, or at least different parts of the data set were needed, you know, so, understanding what you need, understanding how you approach it, there was creativity in that. And there is also the visualisation part in data analysis, where you have to basically choose what type of graph you use, what colours you use. (P9)

Those who had only very limited opportunities to develop and exercise creativity lamented this outcome and suggested the need to offer additional projects or simulations to allow some greater freedom of choice and action in their placement tasks.

In our concluding comments, we will offer a summary of our paper, and we will tease out practice and policy implications, which we suggest flow from our analysis.

Concluding comments

This study contributes to developing the literature on learning and employability in the context of Higher Education in the UK. Our study is distinctive because, where most studies are quantitative, we have employed qualitative methods to explore, in some detail, the placement experiences of students.

We have chosen to focus upon acquiring and developing a set of soft skills, generally accepted as being crucial to employability. These soft skills, we have argued, matter because recruiters recognise *and* value them in the context of graduate employment and because few graduates find themselves in forms of employment that build squarely and directly upon the hard skills developed in their studies. Furthermore, we have observed that these soft skills are important to imminent graduates because their absence reduces employment opportunities, obliging job searchers to accept forms of employment that do not fully reflect their educational attainment. This latter outcome is, of course, sub-optimal for the graduate and indeed counter-productive for universities, who are, amongst other metrics, now ranked according to their graduate employment outcomes.

To generate insights on the acquisition and development of soft skills among placement students that might usefully guide practice and policy, we have examined the experiences of a sample of business students. Our analysis confirms that from the students' perspective, abstract theorisation and 'hard skills' continue to dominate the business studies curriculum. Our research also suggests that students feel that this focus limits the opportunity to acquire and to exercise the complementary, soft skills necessary to enhance employability. It would be trite, however, simply, to suggest that those charged with teaching and with curriculum development should now work to enable students to develop their soft skills because it is clear that the skills necessary to secure this outcome may not be properly present across the existing faculty body. In addition, we should concede that faculty members are now accountable for a range of metrics beyond employability and so may feel conflicted by any simplistic call for change in the curriculum. Indeed, it is important to acknowledge that those faculty members who feel themselves (for a variety of reasons) to be primarily accountable for their research outputs and who may themselves fear for their future employability within the HE sector may simply lack the commitment required to revise the curriculum and their practices to ensure appropriate levels of soft skill development among the student body.

Putting this, perhaps more plainly, we suggest that in the absence of broader change and support, the soft skill development of students (which most would accept is vital) may remain patchy and somewhat half-hearted if existing faculty members are obliged to fall back upon their own resources. This limitation, however, should not be read as suggesting that nothing may be done to improve graduate employability in this context. For example, those faculty members who (for a variety of reasons) question their capability to develop soft skills within the student body may choose to partner with others beyond the university and in so doing may assure some level of soft skill development by inviting private, public and third sector organisations to provide consulting projects and/or 'live briefs' for students. Yet, while voicing this (fairly obvious) suggestion, we will add another important caveat. Thus, we should concede that the management of activities designed to elevate and enhance soft skill development may need to become more hands-on within universities to ensure student engagement. In this context, it would be interesting to understand just how many 'enhancement' events University staff have organised and later cancelled due to a lack of student interest?

Recognising widespread and persistent problems associated with student engagement, we suggest that universities may wish to consider expanding their 'student success' teams and may wish to consider funding coaches and mentors to work in tandem with academic tutors to cement student engagement in those activities designed to develop soft skills.

Turning to consider the placement experience itself: Our research highlights feelings of stress, low confidence and, more generally, a sense of unpreparedness among placement students. While recognising persistent issues associated with student engagement, we suggest that universities should make greater efforts to prepare those going on placement for the challenges associated with the roles that they will fulfil. In this context, we suggest that universities may wish to consider investing in coaching qualifications for a proportion of students returning to their studies from placement. This investment, we suggest, would help to develop an improved understanding of soft skills within the student body and would create a vanguard of student activists who might encourage their contemporaries to understand a) the legitimacy and limitations of their preferred learning styles and b) the immediate and long-term benefits associated with an investment in soft skill development.

While advocating that more should be done to prepare (business) students for the culture shock of professional employment, we also suggest that, within the placement itself, employers should work to offer (stepped) opportunities for growth and development, designed to allow students to rise to new challenges and opportunities. In this respect, it may be timely to remind employers that the placement is, in essence, a much-extended interview which allows students to grow (up) at work. In other words, placement providers need to recognise that properly planned periods of work experience will reward those employers who are prepared to nurture the very obvious, if latent, talents of our youth.

Our study of course has limitations. Whilst our study focuses on the importance of soft skills among business students, we recognise that soft skills are equally important within industries such as healthcare, education, hospitality, social work or the creative industries. Accordingly, we encourage future studies within these contexts.

We acknowledge too, that the research we have undertaken is firmly located within the UK context. Further cross-national comparison and analysis, therefore, is indicated and would certainly be useful. Furthermore, we concede that our study is based on a small sample of students drawn from a university that is recognised as being fully engaged in widening participation activities. Recognising that placement opportunities often vary with and depend upon those social and family connections that tend to be reduced to the shorthand expression, 'cultural capital', it may be instructive to repeat our research with a larger sample and with students drawn from a similar, widening participation institution. Equally, we suggest that there would be merit in repeating our research with students drawn from backgrounds that may be richer in cultural capital and/or with students from different faculties, where placements are also common, such as engineering or nursing.

In addition, we should also acknowledge that while our focus upon five key soft skills is both reasonable and grounded in the extant literature, our preferred soft skill set is far from being either comprehensive or exhaustive. Given this it may be helpful to examine, through further research, the extent to which skills associated with, say, resilience, adaptability and cultural awareness (see Clough et al., 2020; Ng et al., 2024; Rudolph et al., 2023; Waring, 2024) are a) priorities for graduate recruiters and b) reported by placement participants as significant elements of their experience, learning and practice.

It is also important to note that our respondents had little meaningful exposure to AI in their placements. Consequently, issues associated with AI use are peripheral to our study. Yet, given the increasing centrality of this tool and its pace of development, it is surely obvious that future research on graduate skill development should work to consider the ways AI use impacts the acquisition, articulation and development of soft skills.

Finally, we suggest that there may be scope for further research utilising alternative qualitative methods designed to explore the lived experience of work placement activity more fully. To this end, we suggest that work placement tutors (and others) might work to support their students in developing accounts of their employment experiences that utilise the methods associated with ethnography, autoethnography, and participant observation. Such approaches, we suggest, would be particularly illuminating because they might enable the exploration of critical reflexivity in the learning cycle and in so doing might surface issues related to stereotyping and discrimination that are, we suggest, under-developed within current debates on learning and employability in higher education.

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Game flow and attitude in computer-based business simulations: Implications for management education

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Abstract

This research investigates the influence of computer-based business simulations on students' perceived learning outcomes, emphasising the roles of game flow and attitude. Using structural equation modelling to analyse survey data from management undergraduates, the study finds that goal clarity, autonomy, and enjoyment significantly predict game flow, which, in turn, enhances perceived learning outcomes and promotes positive attitudes. Interestingly, attitude does not directly impact students' perceived learning outcomes, pointing to potential moderating effects of individual and contextual factors. The findings extend the game flow theory in management education, offering practical recommendations for enhancing engagement through clear goals, autonomy, and enjoyment. They also underscore the importance of further examining factors that mediate the relationship between attitudes and learning outcomes.

Introduction

According to recent data, approximately one-third of tertiary students globally discontinue their studies (Department Education, 2023), with 48% of these cases attributed to psychological factors such as boredom, unclear academic goals, and insufficient intrinsic motivation (Kocsis & Molnár, 2024; Richardson et al., 2012). Yet, students are not always detached from learning and there are certain situations where they become interested and engaged in learning (McEacharn, 2005). As younger generations increasingly rely on technology in their daily lives, computer-based gamified learning has been widely adopted to enhance student engagement and improve learning outcomes (Nair & Mathew, 2021; Pan & Ke, 2023). By providing behaviourist drill-and-practice learning and a constructivist learning environment, these games are found to improve student commitment, attitude toward learning, and problem-solving skill (Junior & Kim, 2025; Salim et al., 2023).

However, the psychological factors and mechanisms underlying learning outcomes in specific digital gaming contexts remain a topic of debate, with mixed findings reported in the literature (Kosa et al., 2020; Sweetser et al., 2020; Vanwesenbeeck et al., 2016). For example, Landers and Landers' (2014) GameFlow model identifies eight key game elements that fosters an immersive learning experience, thereby enhancing learning outcomes. In comparison, the Technology Enhanced Training Effectiveness Model (TETEM) (Landers et al., 2017) highlights two critical learner characteristics — attitude and prior experience with video games — that may influence the effectiveness of gamified experiences. Empirical testing of these models, nevertheless, suggests that the key antecedents to optimal learning are highly context-specific, depending on sample characteristics, knowledge fields, the learning environment, and the technology employed (Landers & Armstrong, 2017; Nicholson, 2012).

Regardless of the context-dependent nature of learning, most existing research focuses on students in non-management disciplines, leaving management education relatively underexplored. Traditional management education has faced criticism for its didactic approach, lack of practical activities, and excessive reliance on theoretical concepts (Rao, 2016; Sailer & Homner, 2020). While case studies have long been a cornerstone of management learning, exemplifying fundamental principles, they often fail to resonate with young students who lack industry experience, making it challenging for them to comprehend and learn effectively (Rao, 2016). Similarly, other passive learning methods, such as lectures and classroom discussions, have proven inadequate in developing critical management competencies like teamwork, communication, and problem-solving skills (IRC, 2019; National Skills Commission, 2023).

In response, there is growing consensus that contemporary management programs must incorporate more practical training, internships, and simulations to equip students with the skills needed to thrive in today's fast-changing and competitive business environments (Brammer & Clark, 2020). This need is particularly urgent as international students, who are the main revenue source for most management schools, are increasingly finding little value in passive management learning, leading to a decline in their enrolment numbers (Brammer & Clark, 2020). To address this challenge, leveraging technology to align teaching practices with students' evolving learning preferences and needs has emerged as a critical strategy (Burden & Kearney, 2017). Nevertheless, there is limited research on effectively incorporating computer-based games in management education contexts.

Drawing upon Flow Theory and the GameFlow model, this study aims to address the following research questions:

RQ1. What are the psychological antecedents of game flow in computer-based business simulations?

RQ2. How does game flow influence students' perceived learning outcomes and attitudes toward the simulation?

RQ3. Does attitude toward the simulation directly affect perceived learning outcomes?

This research endeavours to explore the above educational gap by assessing the efficacy of computer-based simulation games within management education. Specifically, it focuses on how specific psychological drivers of game flow impact perceived learning outcomes for tourism and hospitality (T&H) management students. To our knowledge, this study uniquely investigates the key determinants of game flow and its relation to effective learning within this domain. Existing simulation studies often prioritise game mechanics (e.g., badges, leaderboards, scores) over the psychological mechanisms that sustain engagement and learning. This paper addresses that gap by identifying goal clarity, autonomy, and enjoyment as core flow antecedents, offering new insights into how simulations can be designed to produce meaningful educational impact. Early findings suggest a significant link between game flow and learning results, underscoring the necessity of incorporating behavioural intentions and constraints when evaluating gamified learning methods.

Literature review

As digital natives, today's students are estimated to have played over 10,000 hours of video games by the age of 21, with the gaming industry anticipated to reach $321 billion by 2026 (Ballhaus et al., 2024). Integrating computer-based simulation games into teaching not only bridges the gap between traditional pedagogical approaches and students' contemporary learning preferences but also provides a risk-free environment for the application and testing of acquired knowledge (Henderson et al., 2017). Consequently, these simulations have gained increasing traction in higher education since the 1970s (Benckendorff et al., 2015; Grijalvo et al., 2022).

Despite their rising popularity, research on the efficacy of digital simulation games in higher educational contexts remains scarce (Salim et al., 2023). Existing work has predominantly concentrated on readily applicable game elements like leaderboards, badges, and prizes, rather than the broader pedagogical potential of the computerised simulation games (Junior & Kim, 2025; Sailer & Sailer, 2021; Silva et al., 2019). This research gap may be attributed in part to implementation challenges. For instance, effective use of digital simulation games requires instructors to gain a comprehensive understanding of game mechanics and to engage in repeated gameplay. The substantial preparation often extends beyond the formal work hours allocated by institutions, leading to resistance among educators or suboptimal implementation when adequate training is not provided (Benckendorff et al., 2015).

Moreover, the use of computer-based simulation games as a primary learning tool requires a significant pedagogical shift, prompting educators to transition from traditional roles as knowledge disseminators to facilitators and coaches (Hernández-Lara et al., 2019). Institutional support and comprehensive professional training are critical for enabling this transformation; however, budgetary and workload constraints pose significant challenges to its successful implementation. As a result, the adoption of multidimensional business simulations that emulate critical operational and managerial activities across key business functions remains a relatively recent development (Benckendorff et al., 2015; Landers, 2019). Furthermore, existing research is concerned primarily with experimental practices, with limited attention given to their theoretical underpinnings (Sailer & Homner, 2020).

The limited scope of existing research is further complicated by mixed findings, underscoring the importance of contextual factors in shaping the applicability of learning frameworks in computerised simulations. For instance, Crookall et al. (1987) cautioned that not all elements of Flow Theory necessarily enhance learning because games per se are not enough for achieving the relevant learning goals. Kosa et al. (2020) echo this idea by providing evidence that, in VR games, only autonomy and satisfaction contribute to the development of flow, while attitude is less significant. This finding contrasts with earlier models, such as Landers' Technology-Enhanced Training Effectiveness Model (2017), which positioned attitude as a critical factor influencing the effectiveness of gamified experiences. Such conflicting perspectives highlight the lack of consensus on whether attitude is a driver, mediator, or a marginal factor in gamified learning — a gap this study aims to clarify by re-evaluating attitude's role in the game flow-learning outcome relationship. Accordingly, further research is needed to identify which specific game attributes (or combinations thereof) operate most effectively in various contexts and how game elements influence individual behaviours and attitudes (Landers et al., 2017; Seaborn & Fels, 2015).

Flow theory and gameflow model

This study contributes to the literature on computer-based simulations in higher education by building upon the Flow Theory and exploring three critical psychological factors — perception of a clear goal, sense of autonomy, and enjoyment, and their influence on students' perceived learning outcomes. Specifically, this study seeks to identify how computer-based simulation games facilitate effective learning within the T&H management context. The antecedents of flow: goal clarity, autonomy, and enjoyment. It is rooted in Flow Theory (Csikszentmihalyi, 1990), widely recognised as a foundational framework in computer-based learning. Flow Theory describes a state of optimal engagement in which individuals are fully immersed in an activity, experiencing focus, control, and intrinsic enjoyment (Csikszentmihalyi & LeFevre, 1989, p. 816). Widely applied in digital education, it underpins gamified learning models like GameFlow (Sweetser & Wyeth, 2005), which align game mechanics such as goal clarity, feedback, and control, with flow elements to enhance player experience and learning outcomes.

According to Csikszentmihalyi (2014), fostering a state of flow is essential for encouraging sustained engagement, wherein learners are so immersed that they "want to pursue them for their own sake" (p. 132). Educational games that enable students to solve problems and overcome challenges tend to enhance interest and foster competence (Fullagar et al., 2013). Empirical research supports the view that flow is positively correlated with motivation and engagement, both of which are linked to improved learning outcomes (Fullagar et al., 2013). While Csikszentmihalyi (1997) initially identified eight dimensions of flow, contemporary scholarship highlights goal clarity, autonomy, and enjoyment as the most relevant factors in digital game-based learning (Kiili, 2006).

Csikszentmihalyi and LeFevre (1989) argued that all flow components are necessary to trigger a flow state. However, Kiili (2006) suggests a distinction between flow antecedents (e.g., goal clarity, control, playability) and flow experience elements (e.g., concentration, time distortion, loss of self-consciousness). Flow antecedents are crucial for initiating flow, while the experiential elements describe learners' psychological immersion. Others have categorised flow into three primary dimensions: arousal (activation level), valence (pleasantness), and feeling state (cognitive and physiological perception during a task) (Scherer et al., 2019).

With regard to this study, three flow elements stand out in the literature: goal clarity, autonomy, and enjoyment. Goal clarity consistently emerges as a key antecedent of flow and motivation in educational games. Clear, specific goals enhance learners' self-efficacy and academic persistence (Locke & Latham, 1990), while also improving autonomy and decision-making (Roy & Saha, 2019; Schippers et al., 2015). The GameFlow model requires goal clarity to be established early and scaled with challenge progression to sustain engagement (Sweetser & Wyeth, 2005).

Autonomy, a central concept in self-determination theory, refers to an individual's ability to make choices and control their actions, free from external rewards or pressures (Deci & Ryan, 2000). Autonomy refers to the learner's sense of control over actions and decisions, a key concept in self-determination theory (Deci & Ryan, 2000). Dynamic simulation games serve as a suitable context for this, where players develop and refine skills in complex, evolving scenarios that mimic real-world challenges. In studies on computer-based games, autonomy has emerged as a critical flow antecedent. It involves players' perception of control over their actions and choices, enhancing immersion and concentration (Kosa et al., 2020).

As a framework for evaluating usability and user experience in games, the GameFlow model is described as a model of player enjoyment, aiming to enhance the fun experience through improved game design (Sweetser et al., 2020; Sweetser et al., 2019). Enjoyment is defined as the positive feeling derived from balancing challenges and a player's capabilities during gameplay (Csikszentmihalyi, 1997; Sweetser & Wyeth, 2005). It reflects a balance between challenge and skill, encouraging students to persist with tasks and return to learning environments voluntarily. In educational games, enjoyment also compensates for limited learner autonomy and reinforces motivation when aligned with feedback and goal clarity (Kosa et al., 2020; Sweetser et al., 2019).

These three constructs were selected because they represent the most consistently identified antecedents of flow in game-based learning literature and align with the foundational principles of Flow Theory. Goal clarity reflects the requirement for clear, structured objectives, a hallmark of flow experiences as defined by Csikszentmihalyi (1990). Autonomy embodies the perception of control over actions, which is essential to sustaining intrinsic motivation within flow states. Enjoyment captures the affective dimension that signals optimal experience and immersion. Collectively, they correspond to the challenge–skill balance and intrinsic motivation core to the flow construct, making them theoretically and empirically suitable for this study. We therefore develop the following hypotheses:

> Hypothesis 1 (H1). The perception of goal clarity contributes to the development of flow experience in computer-based simulations.
>
> Hypothesis 2 (H2). The sense of autonomy contributes to the development of flow experience in computer-based simulations.
>
> Hypothesis 3 (H3). Feeling of enjoyment contributes to the development of flow experience in computer-based simulations.

Game flow and perceived learning outcomes

Learning outcomes are widely recognised as a complex construct encompassing multiple dimensions, including knowledge, understanding, engagement, confidence, self-efficacy, satisfaction, affective commitment, and the intention to pursue further learning or achievements (Baabdullah et al., 2022; Zhang et al., 2012). Building on Kirkpatrick and Craig's (1970) training evaluation framework, Kraiger et al. (1993) categorised learning outcomes into three distinct types: cognitive, skill-based, and affective. Cognitive outcomes refer not only to the acquisition of verbal knowledge but also to its organisation and the development of cognitive strategies through training. Skill-based outcomes involve mastering specific abilities and enhancing performance efficiency through processes such as proceduralisation and composition. Affective outcomes relate to changes in attitudes and motivation, including self-efficacy and motivational disposition.

The complexity and subjectivity of defining learning outcomes have led to ongoing debates about their assessment in empirical research. Erikson and Erikson (2019) note that differing interpretations between educators and students regarding what constitutes successful learning often lead to discrepancies in feedback. However, they maintain that all perspectives offer valuable insights, and challenges in defining and measuring learning outcomes should not deter their investigation or application in educational improvement. To address these challenges, Rajkumar et al. (2011) distinguish between direct and indirect assessment methods. Direct assessments involve objective evaluations of student work against programme learning objectives, whereas indirect assessments rely on students' self-reported perceptions of their abilities. The latter, often gathered through surveys and interviews, reflect perceived learning outcomes and are particularly valuable in educational research contexts.

There are two main schools of thought regarding the mechanism through which flow influences learning outcomes of any kind. On one hand, several studies advocate for a direct and positive relationship between game flow and performance, including models such as GameFlow and its extensions, like Pervasive GameFlow, EGameFlow, and MIU-GameFlow (Csikszentmihalyi, 2014; Fullagar et al., 2013; Zain et al., 2016). The flow state is widely regarded as a driving force behind subsequent behaviours and outcomes across various fields, including market research, cognitive neuroscience, and computer-based learning (Ghani & Deshpande, 1994; Sweetser et al., 2020). Flow Theory researchers similarly argue that students progressively develop their knowledge and skills as problem-solving becomes intrinsically interesting (Fullagar et al., 2013; Oliveira et al., 2021; Özhan & Kocadere, 2020). These ideas lead to our hypothesis:

> Hypothesis 4 (H4). Flow has a positive impact on perceived learning outcomes.

On the other hand, other frameworks, such as Landers and Landers' (2014) theory of gamified learning, emphasize the mediating role of attitude in the relationship between game flow and performance. Attitude research views education as a form of persuasive communication aimed at modifying individuals' attitudes and behaviours (Lavidge & Steiner, 1961). This learning process progresses through three sequential stages: a cognitive phase, where individuals develop awareness and understanding of the learning material; an affective phase, where an attitude

toward the learning is formed; and a conative phase, where conviction and action take place (Lavidge & Steiner, 1961). They argue that the use of game elements alters learners' attitudes toward learning, which in turn induces behavioural outcomes. Recent research confirms that enjoyment during flow predicts learning outcomes via positive attitude (Kosa et al., 2020), and that flow and attitude together account for 66% of the intention to play digital games (Krogstie et al., 2016). Thereby, we posit the following hypotheses:

> Hypothesis 5 (H5). Flow has a positive impact on attitude toward the simulation game.
>
> Hypothesis 6 (H6). Attitude toward the simulation game has a positive impact on perceived learning outcomes.

The proposed relationships between the key factors are presented in the following research model (see Figure 1).

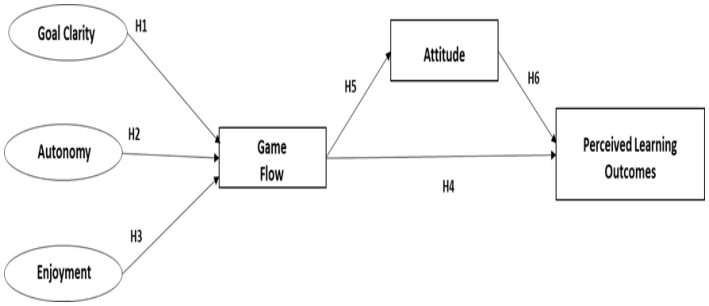


Figure 1. The research model.

Methodology

Simulation background

This study utilised two computer-based business simulation platforms: *RevSIM* (developed by ExperiencePoint Inc.) and *GoVenture* (by MediaSpark Inc.). Both simulations replicate real-world decision-making environments to facilitate experiential learning in business-related units. The two units involved in the study enrol students from across all disciplines within the institute, typically aged between 15 and 24, with a substantial proportion of international students. This diverse and youthful cohort is reflective of the broader composition of management students across Australia (ABS, 2024). The simulation GoVenture Entrepreneur Basic was used in the subject centred on management principles to develop soft skills essential for T&H businesses, while RevSIM was employed in the other subject for its alignment with the subject's focus on hotel revenue management.

Both simulations ran over a six-week period and served as the core assessment tasks for the respective subjects. Assessments comprised three components: simulation performance, a performance evaluation report, and a reflective report on the learning experience. Students participated in teams of three and were tasked with launching and managing a business within the T&H sector. They oversaw functions such as daily operations, marketing, financial performance, human resources, customer service, and supply chain management. As teams met predefined performance thresholds, they were allowed to "level up" and manage multiple, more complex businesses under increasingly demanding conditions.

Prior to the formal simulation, students were given a three-week preparatory period during which they could explore the game's mechanics through unlimited practice. During this phase, they were encouraged to perform simple management tasks or restart the simulation as needed. This process was designed to ensure a solid understanding of the game rules and objectives. The official simulation began in Week 6 with unique and dynamic scenarios to test their applied skills in a more realistic and challenging environment.

Weekly tutorials enabled students to reflect on team progress and benchmark their performance against peers. Each game generated performance summaries at the end of each business cycle, and students had access to real-time feedback via business summary reports. This structured format supported the transition from guided practice to strategic decision-making and execution. Weekly tutorial discussions provided an opportunity for students to review their team's progress and compare their simulation performance with their peers. Each game generated a performance summary at the conclusion of each business period, and students were able to access real-time feedback on their progress by reviewing business summary reports at any point. The following chart summarises the implementation of the simulations.

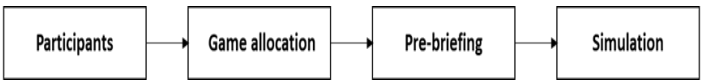


Figure 2. Flowchart of the project.

The researchers, who also served as subject lecturers, established varying levels of goals within the simulations, enabling students to advance by overcoming progressively challenging tasks. Lecturers delivered face-to-face explanations of the game goals and rules, complemented by detailed step-by-step instructions on how to navigate the simulations. Furthermore, students had access to online learning modules available through the Learning Management System throughout the semester. These modules included short videos on critical management strategies and concepts, as well as written manuals for the simulations. To reduce bias in the evaluation of the learning experience, the post-simulation survey was administered by academic staff who had no involvement in the delivery of the subjects. The survey was distributed only after the completion of all teaching activities. The survey instruments and procedures were reviewed and approved by the Human Research Ethics Committee of William Angliss Institute (Approval No: 2023-03-21-04). All responses were anonymised to ensure confidentiality and maintain research integrity.

Instruments and data collection

All items measuring the antecedents of flow were adapted from validated instruments in prior studies by Fu et al. (2009) and Silva et al. (2019). To assess attitude toward the simulation, three items were drawn from Landers and Armstrong (2017) (e.g., "If I had the choice, I would choose to complete classroom training in which such a simulation game was used"). Perceived learning outcomes were assessed using both cognitive and affective indicators, following the approach of Paechter et al. (2010) and Wei et al. (2023). Cognitive outcomes pertain to the extent to which students feel they have mastered the knowledge imparted by the game (e.g., "The game has enhanced my management knowledge"), while affective outcomes reflect students' satisfaction with their learning experience (e.g., "I'm satisfied with the learning experience").

The items were assessed on a 5-point Likert scale with endpoints of 1 = *strongly disagree* to 5 = *strongly agree*. To ensure content validity, a pilot test of the questionnaire was conducted with three faculty members in higher education prior to data collection. Based on insights from preliminary and pilot tests, item wording was adjusted to better align with the study's context, culminating in the finalised survey questions.

Following the popular methodology in this field (Silva et al., 2019; Vanwesenbeeck et al., 2016), we employed retrospective self-reported measures to approximate the factors of interest. This approach is suitable for evaluating subjective constructs such as perceived learning outcomes, enjoyment, and attitude, which are best captured through personal reflection following a complete learning experience. Retrospective self-reports enable learners to assess their experience holistically, particularly in the absence of objective behavioural tracking during simulation gameplay. Students were invited to complete an anonymous online survey at the end of the semester regarding their learning experiences using the simulation. Submission of the completed questionnaire indicated their consent to participate in the project. A total of 154 responses were submitted. Following the exclusion of outliers and incomplete responses, the final dataset comprised 123 responses. The gender distribution reveals that a majority were male, comprising 58.5% of the total, while females accounted for 41.5%. Most respondents were aged between 18-24 (Mean=23.4 years, Standard Deviation=4.9), representing 97.6% of the sample, and there was a higher proportion of international students (57.7%) compared to domestic students (42.3%). Additionally, 65.9% of participants used the GoVenture simulation, whereas 34.1% used RevSIM.

Data analysis

This study examined a model using structural equation modelling (SEM) via AMOS 26.0. Although the final sample size (n = 123) is slightly below the general recommendation of 150–200 for covariance-based SEM (Hair et al., 2014), it is considered acceptable due to the model's relative simplicity, the strength of factor loadings, and the overall robustness of the model fit indices. Comparable sample sizes have been reported in published studies applying similar analytical frameworks in educational contexts (Wolf et al., 2013). Two steps are included in SEM. First, evaluating and refining the measurement model using confirmatory factor analysis (CFA) and, secondly, testing the estimation of the structural model and hypotheses (Byrne, 2016). This two-step approach ensures that adequate processes have been undertaken to learn about the theoretical constructs and their interrelations (Anderson & Gerbing, 1988). Covariance-based SEM is a method used to test complex relationships between variables simultaneously and is particularly employed for testing theoretical causal relationships, with causal inferences primarily drawn from the observational nature of the data (Kosa et al., 2020).

Results

Measurement model: First-order CFA

A CFA was performed on the sample dataset to evaluate the measurement model. All first-order constructs including *goal clarity, autonomy*, and *enjoyment* were treated as correlated factors, utilising the maximum likelihood estimation method. Factor loadings for the 8 indicators, ranging from .70 to .92 and surpassing the recommended threshold of .70 (Hair et al., 2014), were significant ($p < 0.01$) on their respective constructs, with critical ratios exceeding 2.57 (Netemeyer et al., 2003) as shown in Table 1, thereby affirming strong convergent validity.

Table 1. Results of confirmatory factor analysis.

Constructs and Items	*M*	*SD*	SFL	Critical Ratio	CR	AVE	Cronbach's alpha
Goal clarity	3.93	1.14			.83	.62	.81
The rules of the game were clearly presented.			.71	7.76			
Overall, game goals were presented clearly.			.91	N/A			
I understood the learning objectives through the game.			.76	8.78			
Autonomy	3.95	1.10			.76	.61	.74
I felt a sense of control over the game.			.70	5.69			
I knew what the next step was in the game.			.85	N/A			
Enjoyment	3.86	1.12			.81	.60	.80
I enjoyed this simulation game.			.70	N/A			
Learning through this simulation game is fun.			.92	6.96			
The game stimulated my curiosity for learning management knowledge.			.73	6.74			

Note: M=mean; SD = standard deviation; SFL = standardised factor loading, CR = composite reliability; AVE = average variance extracted.

The values for both composite reliability (between .76 and .83) and Cronbach's α (between .74 and .81) averaged above .70, suggesting that latent variables showed adequate internal consistency. Furthermore, the average

variance extracted (AVE) for all constructs exceeded the .50 threshold (Fornell & Larcker, 1981), supporting the construct reliability of the measurement scales, as presented in Table 1. Although autonomy was measured using only two items, this approach has been adopted in prior SEM studies when items show strong factor loadings and internal consistency (Hair et al., 2014). Given the acceptable AVE, CR, and α values, the construct was retained as reliable for model estimation. Additionally, Table 2 reveals that the square roots of AVE for constructs, highlighted in bold on the diagonal, are greater than the intercorrelation among all pairs of constructs, confirming the constructs as valid measurements that represent distinct concepts. The results of the analysis indicate that the proposed conceptual model had a good fit, with $\chi 2$ = 30.490, *df* = 17, $\chi 2/df$ = 1.79, $p < .001$, GFI = .94, CFI = .97, RMSEA = .08, and SRMR = .04.

Table 2. Results of discriminant validity analysis.

	Goals	Attitudes	Learning Outcomes	Enjoyment	Autonomy
Goal Clarity	**.79**				
Attitudes	.38**	**.78**			
Learning Outcomes	.22*	.20*	**.83**		
Enjoyment	.47***	.54***	.26*	**.77**	
Autonomy	.61***	.36**	.27*	.46**	**.78**

Note. The bold diagonal elements are the square roots of the variance shared between the constructs and their measures. Off-diagonal elements are correlations between the constructs.

*$p < .01$., **$p < .05$., ***$p < .001$.

Measurement model: Second-order CFA

The CFA was employed to verify the suitability of modelling *Game Flow* as a second-order hierarchical latent construct involving three dimensions before including it in the structural model. The CFA results reveal that the proposed second-order construct has an adequate goodness-of-fit based on the cut-off points in the existing literature, with $\chi 2$ = 30.490, *df* = 17, $\chi 2/df$ = 1.79, $p < .001$; GFI = .94, CFI = .97, RMSEA = .08, and SRMR = .05. The lower-order constructs all loaded significantly on *Game Flow*, with alpha levels at .001 ranging from .60 to .79. The second-order model explains between 35% and 63% of the variance in the underlying factors. Consequently, the construct of *Game Flow* encompasses all three dimensions: goal clarity, autonomy, and enjoyment.

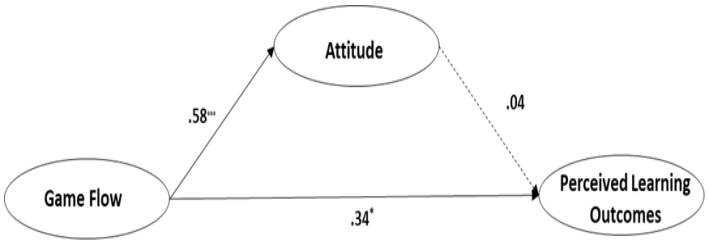
Structural model

The overall structural model had a tolerable goodness of fit with $\chi 2$ = 112.606, *df* = 72, $\chi 2/df$ = 1.56, $p < .001$, GFI = .90, CFI = .95, RMSEA = .06, and SRMR = .08. The results of the structural path coefficients examination suggests that two paths were supported, but one path (i.e., attitude → learning outcomes) was not supported. The results indicate that game flow significantly predicts students' perceived learning outcomes (β = .34, $p < .05$) and attitude (β = .58, $p < .001$). The p-values reflect the probability that the observed relationships occurred by chance, with $p < .05$ indicating less than a 5% likelihood and $p < .001$ indicating less than a 0.1% likelihood of the effect being due to random variation, thus providing strong empirical support for the proposed relationships between game flow and both learning outcomes and attitude.

Table 3. Results of the second-order measurement model.

Hypothesis	Path	Standardized Factor Loadings	Critical Ratio	R^2	Result
H1	Goal Clarity ← Game Flow	.79	N/A	.59	Supported
H2	Autonomy ← Game Flow	.77	3.52***	.63	Supported
H3	Enjoyment ← Game Flow	.60	3.51***	.35	Supported

***$p < .001$.



*$p < .05$. *** $p < .001$.

Figure 3. Results of structural model analysis.

Discussion and implications

This theory-driven study aims to enrich our understanding of the relationship between game flow and learning outcomes by empirically testing hypothesised relationships using structural equation modelling. While the GameFlow Model focuses on sets of game features and criteria that lead to a flow state, this research proposes that the presence of three psychological features in particular – goal clarity, a sense of autonomy, and enjoyment – predicts the flow experience and contributes to learning outcomes.

The results of this study establish a robust foundation for understanding the multi-dimensional constructs of goal clarity, autonomy, and enjoyment in relation to game flow (H1-H3). This confirmation not only reinforces the reliability of the game flow measurement used but also underscores the significance of these psychological factors as key antecedents of game flow in educational simulations. The findings reveal that students are likely to develop flow experiences in computer-based simulations through clear learning goals from a goal-oriented approach (Schippers et al., 2015), a perceived sense of control over actions and choices informed by self-determination theory (Deci & Ryan, 2000), and positive feelings from the user experience aspect

of games (Sweetser et al., 2020). By validating this measure, the analysis establishes a credible basis for exploring the intricate relationships among these psychological factors and their impact on learning outcomes, paving the way for further structural model analysis.

The confirmed hypotheses (H4 and H5) reveal a significant, positive relationship between game flow and learning outcomes, as well as game flow and attitude towards the game. These findings are consistent with prior research indicating that flow can significantly enhance both the learning experience and the disposition towards learning activities (Csikszentmihalyi, 2014; Kosa et al., 2020). Specifically, the substantial path coefficient from game flow to attitude suggests that engaging students in a state of flow can notably improve their perception and receptiveness towards the learning tool, in this case, simulation games.

However, the hypothesis that attitude towards the simulation game would positively impact learning outcomes (H6) was not supported. This unexpected result implies that while flow can directly enhance learning outcomes and positively affect students' attitudes, the attitude itself might not translate directly into learning effectiveness. This aligns with the work of Oliveira et al. (2021) and Özhan and Kocadere (2020), who suggest that while positive attitudes towards gamified learning environments are critical, they do not automatically guarantee enhanced learning outcomes. Kosa et al. (2020) also explored how flow elements and attitudes influence learning effectiveness in computer-based environments, concluding that attitudes were relatively insignificant. They reasoned that the similarity between the constructs of attitude and intention to play diminished the relevance of attitudes in their study context. Building on this premise, our research eliminated the intention construct to further examine the role of attitudes in a virtual simulation environment. Our findings align with Kosa et al.'s results, confirming that attitudes do not directly impact learning outcomes in such settings.

This outcome also redirects attention towards the intricate process of information processing and the multifaceted nature of attitude formation, suggesting a nuanced interaction between situational factors, temporal connections to stimuli, and subsequent behavioural outcomes (Calanchini & Sherman, 2013; Oswald et al., 2015). Attitude is conventionally defined to contain a behavioural component (e,g., behavioural intention), dissonance between attitude and behaviour is not uncommon due to the influence of external constraints, the social context, attitudinal attributes (e.g., accessibility, stability), and the reciprocal relationship between the two constructs (Glasman et al., 2006; Kroesen et al., 2017). Bechler et al. (2021) further demonstrated that the attitude-behaviour relationship might follow a nonlinear pattern. Specifically, as attitudes shift from extremely negative to extremely positive, the corresponding behavioural change initially remains flat (when attitudes progress from extremely to moderately negative), becomes steep as attitudes transition from negative to positive, and tapers off once attitudes move from moderately to extremely positive.

This study makes three key contributions to the literature on computer-based learning and gamification in education. First, this research pioneers the exploration of psychological drivers of flow and their direct and indirect effects on learning outcomes within the context of T&H management education. While existing studies have primarily focused on disciplines such as science, accounting, and marketing, this study extends the scope to the tourism and hospitality domain, addressing a critical gap. Specifically, the findings identify goal clarity, a sense of autonomy, and enjoyment as essential antecedents of game flow among management undergraduates. These insights align with and extend Sweetser et al.'s (2019) proposition that flow can occur even without all eight flow elements, with certain elements playing a more prominent role in driving the experience.

Second, this research contributes to the game flow literature by highlighting the nuanced relationship between flow, attitudes toward learning tools, and learning outcomes. The findings demonstrate that while flow positively influences attitudes toward simulation games, the conversion of positive attitudes into tangible learning outcomes may be impeded by personal and situational constraints. This adds depth to the understanding of the limitations of attitudes as predictors of learning effectiveness, encouraging further investigation into the mediating variables that shape this relationship.

Finally, this study provides actionable insights for educators and instructional designers aiming to enhance engagement and learning through computer-based simulations. Educators should prioritise clearly defined and progressively challenging goals by using structured milestones, rubrics, and scenario-based missions that guide students through complex decisions. To enhance autonomy, instructors can allow students to choose among different roles, decision paths, or business scenarios within the simulation. For instance, giving students the option to manage marketing versus operations functions lets them shape their learning based on interest or career goals. Enjoyment can be increased by embedding time-based challenges, team competitions, or feedback badges that reflect student performance in real time. These design and implementation strategies, grounded in goal clarity, autonomy, and enjoyment, help foster game flow and improve educational effectiveness.

This study offers practical guidance for educators and instructional designers seeking to improve student engagement and learning through computer-based simulations. Clearly defined, progressively challenging goals should be emphasised, supported by ample orientation and practice before gameplay begins. To promote autonomy, students should be given meaningful choices—such as selecting strategies or roles—enhancing their sense of control and motivation. Enjoyment can be fostered through timely feedback and elements of playful competition aligned with learning objectives. Grounded in goal clarity, autonomy, and enjoyment, these design strategies can help cultivate game flow and boost educational effectiveness.

Although this study focuses on T&H management education, the findings have broader relevance to other disciplines that employ experiential or simulation-based learning.

The core drivers of game flow are transferable to contexts such as business, healthcare, and engineering, where learner autonomy and intrinsic engagement are equally important. Future research could further test the model's applicability across varied educational settings to assess its generalisability. These findings also align with constructivist learning principles, where knowledge is actively constructed through immersive, goal-directed experiences. Similarly, the emphasis on autonomy and enjoyment reflects key elements of engagement theory, which posits that meaningful learning emerges from interactive, learner-driven tasks supported by technology. Together, these frameworks reinforce the value of simulation-based flow in supporting deep, student-centred learning.

Conclusion

Through a review of the drivers of game flow and the mechanism by which the flow state promotes learning outcomes, this research aims to provide valuable insights into the relationship between these elements. Our findings advance computer-based learning research by highlighting three psychological factors — goal clarity, a sense of autonomy, and enjoyment — as key contributors to fostering a game flow experience and improving learning outcomes in hospitality education. Given the unique features of the tourism and hospitality industry compared to other industries, these findings emphasise the importance of the learning context in understanding the effectiveness of a particular game design. Notably, the results underscore the need to account for constraints in translating attitude into relevant behaviour, which presents an opportunity for future research. Future studies may also test the proposed relationships in different contexts (e.g., education in other fields or non-Western countries) or use more longitudinal data to examine the findings over time.

Limitations and future research

While this study provides valuable insights into the psychological drivers of game flow and their influence on learning outcomes, several limitations must be acknowledged. First, the reliance on retrospective self-report measures may introduce recall or social desirability bias. Future research could incorporate behavioural tracking or longitudinal designs to complement self-reported perceptions. Second, the final sample size (n = 123) was slightly below CB-SEM recommendations (Hair et al., 2014), although model fit and reliability metrics were robust. Third, autonomy was measured using only two items. While factor loadings and internal consistency were acceptable, future studies should use additional items to capture the construct more comprehensively.

Finally, the context was limited to tourism and hospitality management students at a single institution. Replication across diverse educational contexts would help generalise the findings. While this study focuses on learning outcomes as the key dependent variable, constructs such as behavioural intention were excluded to maintain model parsimony and reduce survey fatigue. However, this may limit direct comparability with studies that frame intention as a key mediator between flow and learning behaviours. Future research could incorporate intention measures to align with established frameworks such as the Technology Acceptance Model (TAM) or Theory of Planned Behaviour, enabling cross-study benchmarking.

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A cause for academic euphoria: Seven BTS songs that inspire the learning and teaching of services marketing

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Abstract

Songs have been used as an effective learning tool in marketing. Despite the popularity of the K-pop group BTS in popular culture and the importance of services marketing in academia and industry, few studies have examined BTS through the lens of learning services marketing. This opinion piece discusses the services marketing lessons that can be inspired by the songs of BTS. A BTS-Services Marketing Playlist compiling seven selected BTS songs is introduced that captures and synthesizes key fundamental as well as contemporary themes in the services marketing literature. The integrated list of topics and consolidated key literature in the playlist can inspire future research directions for researchers who aim to specialize in the services marketing field. Further, the playlist is a useful compilation that can guide content creation and lesson planning for higher education programs in services marketing. This paper is one of the first to connect K-pop songs to services marketing and pedagogy and contributes to the literature on using the arts for the teaching and advancement of services marketing education.

Introduction

> *"I often think in music" – Albert Einstein (Greene, 2021, p. 161).*

BTS, which stands for "Bangtan Sonyeondan" or "Beyond the Scene" is a multi-award-winning seven-member boy band comprising RM, Jin, SUGA, j-hope, Jimin, V, and Jung Kook (Kang, 2023). Representing the fourth-generation K-pop group from South Korea (Mackenzie, 2019), since their debut more than a decade ago in 2013, the band has grown to become a global phenomenon and generated more than USD 3.6 billion annually for the South Korean economy (Taylor, 2022). The seven members have broken multiple records, captured fans from the east to the west, and have been acknowledged by the international community for their music, entertainment value, and contribution to global culture (Kang, 2023).

Global popular culture can indeed be a force for many things, including the learning of marketing-related disciplines. For instance, Ivanov (2023) reflected on the relationships between salient themes in the Star Wars movies and the future of tourism and hospitality. On music, studies have investigated a myriad of phenomena, including the ability of music to affect brand attitudes (Chou & Lien, 2010), identify key communication themes (Henard & and Rossetti, 2014), and be used as a tool for research (Hartmann & and Ostberg, 2022) and learning in marketing (Bryant & and Riley, 2024; Weinrauch, 2005). In a recent study, Rich and Dingus (2024) developed 15 songs to teach the principles of marketing.

Given the significant impact of BTS in music, while most studies have analyzed BTS in terms of their growth and popularity (Courtney Mc & null, 2020; Hong et al., 2024; Lee et al., 2021; Parc & Kim, 2020), none have focused on providing perspectives of how BTS songs can inspire the teaching of the equally dynamic discipline of services marketing and its myriad of developments (Huang et al., 2021; Wirtz & Lovelock, 2022) with emerging technologies including artificial intelligence (AI) (Noor, 2024; Wirtz & Stock-Homburg, 2025).

Inspired by Ivanov (2023) and the aforementioned studies on popular culture and marketing, this viewpoint is written by the article author who is a services marketing academic as well as a BTS Army (bias: Jung Kook). Anchored by Gardner's theory of multiple intelligences in which musical intelligence can trigger and strengthen other intelligences (Rich & Dingus, 2024), this article answers the call by Heath and Tynan (2023) on the use of arts for marketing education and reflects on how seven selected songs by BTS mirror key concepts in the services marketing literature. The compilation of topics and key articles reviewed in the BTS-Services Marketing Playlist can serve researchers who wish to consider a wide spectrum of key research topics within the field. Educators can use our playlist to optimize the creative nature of teaching services marketing with BTS.

The BTS-services marketing playlist

This section lists seven selected BTS songs in the BTS-Services Marketing Playlist. The selection is based on the popularity of the song, its salience to important service marketing concepts, as well as the author's experience in using these songs as pre-lecture music and during classroom teaching. Each song is introduced with its background and lyrics from Genius (2025), one of the largest global repositories for song lyrics and community contributions of musical knowledge. This viewpoint then gives its reflections on how the song relates to services marketing through a synthesis of the key literature. The order of the songs is suggested based on the nature and coherent flow of the topics: from optimizing the service brand and experiences, to managing external and internal customer relations, and concluding with customer care and well-being.

Dynamite: Creating brand differentiation and distinctiveness

"Dynamite" was released as a single track album in August 2020 (Kang, 2023). The song exploded with joy and confidence as it made history as the first track to be completely sung by the BTS members in English. This spirit along with the song's lyrics "Cause I'm in the stars tonight. So watch me bring the fire and set the night alight. Shinin' through the city with a little funk and soul. So I'ma light it up like dynamite." suggest the importance of being bold and different. Indeed, the marketing literature has long advocated the importance of brand differentiation as a key component to strengthening brand equity (Aaker, 1991; Keller, 1993, 2001). While the differentiation concept has been applied for both product and service industries, emerging studies have given attention to the unique aspects of brand management for services, including how quality-based personalization strategy (i.e., differentiation or customization) is more suitable for products while relationship-based personalization strategy is more effective for services (Huang & Dev, 2019). Turning our attention to BTS, it is also arguable that there is nothing truly different about a K-pop band singing in English or wanting to shine in the city; explosive dynamite is not as different as it is noticeable. These arguments support propositions for a greater emphasis on brand distinctiveness as opposed to differentiation and the importance of being noticeable by creating brand associations that help to identify the brand (Romaniuk et al., 2007).

Left and right: Building mental and physical availability

"Left and Right" is a collaboration between BTS member Jung Kook and Charlie Puth and was released in June 2022 (Atkinson, 2022). The song's central theme is about yearning for someone who has successfully competed and occupied the person's thoughts, with its lyrics "Memories follow me left and right. I can feel you over here, I can feel you over there. You take up every corner of my mind. Whatcha gon' do now?". Similarly, brands that successfully compete for mental and physical availability make it easier for consumers to remember and select them (Sharp, 2010). Mental availability refers to how accessible the brand is in memory in

various cues that come to the consumer's mind - also known as category entry points or CEPs (Romaniuk, 2018) - while physical availability refers to the presence, relevance, and prominence that the brand has (Romaniuk & Sharp, 2016). Emerging research suggests that physical availability may be more critical for full-service restaurants as opposed to those with limited service (Lynn, 2024). Accordingly, similar to the collaborative efforts required to produce the hit song "Left and Right", more collaborations with service consumers are required to build appropriate mental availability (Romaniuk, 2023) and physical availability (Romaniuk & Sharp, 2016) to ensure that the brand is available to service consumers in all directions.

Universe: Creating omnichannel and omnipresence experiences

"Universe" was released in September 2021 by BTS and British rock band Coldplay and soon became the first collaborative song to top the Billboard charts (Jihye & Hayeon, 2021). Its lyrics "In the night, I lie and look up at you. When the morning comes, I watch you rise. There's a paradise that couldn't capture, that bright infinity inside your eyes." suggest the immersive love that is yearned to be captured yet difficult to fully experience between characters in different universes. Indeed, actualizing such immersive experiences can prove challenging for brands that need to be able to integrate and optimize all offline and online touchpoints to cater to the multidimensional expectations of customers across these physical and digital universes (Rahman et al., 2022). The use of AI-assisted technologies can assist in achieving the business goals of creating omnichannel experiences (Thaichon et al., 2024). Further effective collaboration strategies with AI and other human experts, as exemplified in the collaborative success of the "Universe" song itself, need to be explored to increase omnipresence in which the customer feels that they are being accompanied by the same, familiar companion throughout their customer journey (Liu et al., 2024).

Butter: Building bonds and reducing churn

"Butter" was released as a single track album in May 2021 (Kang, 2023). Its lyrics "Smooth like butter. Pull you in like no other. … Side step, right, left to my beat. Get it, let it roll." paint an uplifting positive energy. Indeed, similar to the butter churn device in which cream acts as the foundation and is bonded and rolled without much barrel spillage to create a smooth outcome, service managers aim to build the key outcome of customer loyalty by creating loyalty foundations, loyalty bonds, and reducing customer churn as conceptualized in the wheel of loyalty (Wirtz & Lovelock, 2022). Delivering quality service with AI can contribute to customer loyalty (Noor et al., 2022b). The emergence of generative AI (GenAI) allows for AI to create emotional connections and deepen bonds with service customers (Huang & Rust, 2024). Finally, in terms of reducing churn, increasing advances in AI-based models allow for more personalized relationship management by predicting customers who may churn and thereafter creating service fees that are acceptable to them (Ortakci & Seker, 2024). Further research relating to churn intelligence with AI is required to improve customer retention (Singh et al., 2024).

Life Goes On: Managing service recovery and relations

"Life Goes On" was featured in the BTS album "BE" released in November 2020 (Kang, 2023). The comforting lyrics of the main chorus which translate to "Like an arrow in the blue sky, another day flying by. On my pillow, on my table, yeah, life goes on. Like this again." reflect the ever-changing, fleeting moments of life and how our experiences can be shaped by the way we manage these events. In services, a critical component of reducing churn is managing difficult situations with customers; these moments can represent opportunities for effective service recovery. Appropriate procedural and distributive justice and, in particular, interactional justice, can turn complainants into returning customers in the context of traditional service encounters (Blodgett et al., 1997). Emerging research further suggests that human service agents continue to remain important when giving apologies to customers, while AI agents may be preferred when the customer requires an explanation of the service failure (Fürst et al., 2025). As organizations increasingly use AI to manage both external customer relations and internal ones (i.e., with employees), more research is required to fully understand how decisions, lapses, and explanations with AI may be perceived differently from their human counterparts (Narayanan et al., 2024).

Permission to Dance: Empowering service employees

"Permission to Dance" is the second track from the BTS album "Butter" released in July 2021(Kang, 2023). The rhythm of the track is designed to make hearts beat and contains the lyrics "We don't need to worry, cause when we fall, we know how to land… cause we don't need permission to dance". In services marketing, the service beat grows in tension particularly during moments when the service fails and the customer is dissatisfied. To this, the literature has long acknowledged the important role of service employees and how the challenges of managing the needs of the complaining customer can be promptly addressed with employee empowerment (Lashley, 1995). A culture of empowering leadership by service managers can lead to employee empowerment and creativity as well as better teamwork which is vital for managing the uncertainties of service (Hoang et al., 2021). In the context of AI service agents and the anxieties their introduction in the workplace may cause service staff, further research is required to better understand how the adoption of AI can further motivate service employees to instead become more empowered and productive (Tan et al., 2024).

Euphoria: Improving customer well-being with AI

"Euphoria" was featured in the album "LOVE YOURSELF" released in August 2018 (Kang, 2023). Sung by Jung Kook, the lyrics of the song capture a feel-good sensation that transcends mere attraction: "Take my hands now, you are the cause of my euphoria… when I'm with you, I'm in utopia." Closing this pedagogical playlist, beyond traditional outcome

measures of customer retention, the services marketing field continues to advocate for a more transformative agenda focusing on more sustainable service outcomes that uplift individuals and communities in their well-being (Field et al., 2021). The call for greater attention to customer well-being has permeated across multiple service industries, from retail (Troebs et al., 2018) to luxury (Batat, 2022) and even in higher education with GenAI (Cambra-Fierro et al., 2024). Indeed, the emergence of the fifth industrial revolution promises greater human collaboration with multiple AI-enabled technologies, with a focus on the well-being of all stakeholders in the service ecosystem (Noble et al., 2022). In this vein, researchers continue to make important strides in better understanding how AI-enabled technologies can be used to transform the well-being of users for the better (Huang & Rust, 2024; Noor et al., 2022a).

Conclusion

The BTS-Services Marketing Playlist shows how music can motivate the understanding of key services marketing themes as well as update its audience of learners with more contemporary issues. Through a reflection of popular BTS songs as well as a synthesis of the services marketing literature, this article contributes to the literature on the use of the arts, particularly music and K-pop, for the effective learning and teaching of marketing-related disciplines. The BTS-Services Marketing Playlist assists in the consolidation of various fragmented topics and key literature and can serve as a useful update and anchor for researchers needing ideas to build their research portfolio in services marketing.

For practitioners, there are several ways to optimize the playlist for learning and teaching. First, short videos can be created and shared on social media that feature the song and the accompanying lesson to generate interest. For higher education courses with full semester durations, the playlist can serve as a key component in the subject plan by outlining the topics that would be covered. Each song in the playlist can be applied in the form of a topic introduction video featuring the track and an explanation of what the upcoming course would entail. Instructors developing new programs may wish to create their unit plans using the underlying services marketing themes of the seven songs in the order suggested in the playlist. On the other hand, instructors with existing lesson structures can embed the song as part of their teaching method when the relevant services marketing topic linked to the song is taught. Assessment methods can include written individual assignments asking students to reflect the BTS song to group performances in which students give their own take on the lessons learned via a music video production. Finally, shorter courses for student clubs and marketing associations or training workshops designed for the wider public may be developed to cover the topics of interest.

Overall, it is remarkable that BTS songs can contain such rich insights in services marketing; perhaps this reaffirms the marketing genius that is BTS and the members' intuitive marketing insights as reflected in their songs. However, while seven songs have been originally selected in this paper, educators are encouraged to adapt the playlist and make it their own with other songs that they can draw inspiration from. In terms of the effectiveness of these songs for teaching, the article author has personally found that the "Butter" track is useful for teaching the wheel of loyalty, as students could better understand and remember the concepts. While this article has conceptually argued that the entire playlist can be an effective teaching tool for services marketing, practical measures including student feedback and classroom observations are required to better evaluate the effectiveness of the implementation of the BTS-Services Marketing Playlist. Overall, it is hoped that the playlist can be used as a key element to guide the design and experience of a more euphoric class on services marketing.

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Book review of Leonardo Veliz (Ed., 2025). Multiculturalism and multilingualism in education. Brill.

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Introduction

On 3rd March 2025, U.S. President Donald Trump signed a historic executive order designating English as the official language of the United States. Remarkably, this decision marks the first instance of a federally mandated official language since the nation's founding nearly 250 years ago (Davies, 2025). This political act does not merely symbolise linguistic unification; rather, it exemplifies a broader global resurgence of monocultural and monolingual ideologies, at times escalating into overt hostility towards multilingual and multicultural identities. Indeed, across multiple nations, recent years have witnessed a troubling surge of what might be described as 'anti-languages madness' (Lo Bianco, 2025), where nationalist discourses promote exclusionary practices and linguistic intolerance.

Against this troubling global backdrop, we are facing a paradox: while globalisation connects diverse cultures more closely than ever, many nations simultaneously retreat into isolationism. Pluralism, a concept thoughtfully explained by Banks and Banks (2020), is essential; it describes how various cultural identities can co-exist equitably in a shared society. Yet, the deep-seated monolingual mindset remains a stubborn barrier, and superficial diversity initiatives simply are not enough. To make meaningful societal progress, genuine pluralistic approaches are urgently needed (Veliz, 2025).

Education lies at the very heart of this transformative journey. Classrooms around the world are becoming increasingly multicultural and multilingual, challenging traditional educational frameworks. Educators today across all subjects require new tools, training, and perspectives to effectively teach diverse student populations (Tao & Liyanage, 2020). This makes the volume *Multiculturalism and Multilingualism in Education* (published by Brill in 2025; see Figure 1), edited by Associate Professor Leonardo Veliz, who currently serves as Head of Department – Curriculum at the University of New England, particularly timely and prominent.

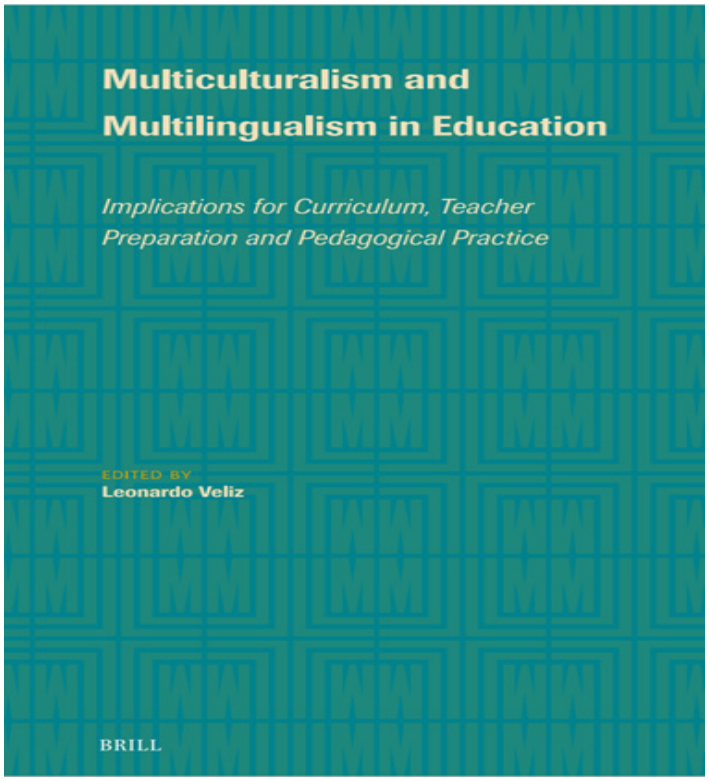

Figure 1: The book cover of *Multiculturalism and Multilingualism in Education.*

Organisation

Beyond a concise introduction that establishes its conceptual framework and previews its contents, I found the structure of this book especially helpful, thoughtfully partitioned into three thematic sections across its 13 chapters. In this review, I will mirror this tripartite structure, as it provides a coherent and effective lens through which to critique how the contributors engage with the imperative themes of language policy, teacher preparation and practice, and the social fabric of pluralistic communities.

Part One (Chapters 1-3) is dedicated to how language policies unfold in different educational contexts. In Chapter 1, Rebecca Ward examines the lack of coherent multilingual

inclusion policies for children with developmental disabilities across the UK's four nations. Drawing on a comprehensive analysis of 77 government resources, she points out a significant policy gap, urging a more consistent and supportive top-down framework. Chapter 2, by Mauricio Véliz-Campos and Fabiola P. Ehlers-Zavala, shifts the discussion to Chile, offering a powerful critique of linguistic hegemony in foreign language education. They propose a Human Ecological Language Pedagogy that recognises local contexts and supports a decolonial, socially just vision of language teaching. In Chapter 3, Anita Dewi and Cindarsatio Damarhapsoro analyse Indonesia's national language policy. Through document review and interviews, they expose the tension between policy prescriptions and everyday multilingual practices; their study highlights how code-switching between Bahasa Indonesia and local languages like Javanese can enhance both instruction and student identity.

The second section (Chapters 4-9) focuses on equipping teachers to navigate culturally and linguistically diverse classrooms. In Chapter 4, Nell Foster and colleagues introduce Functional Multilingual Learning, a pedagogical approach that bridges language awareness and translanguaging in Belgium's complex linguistic landscape. It offers a robust model for incorporating students' full linguistic repertoires into instruction. Chapter 5, by Laura Gurney and Eugenia Demuro, explores how language teachers in Australia and New Zealand conceptualise their own multilingualism. Their findings suggest a lack of shared definitions among educators and propose the concept of 'languaging' to better capture their lived linguistic realities.

Chapter 6 presents a grounded case study from Malta, where Antoinette Camilleri-Grima demonstrates how pluralistic pedagogy can successfully engage migrant learners in Maltese language learning, contributing to both linguistic proficiency and social integration. Chapter 7, authored by Michelle Kohler and Angela Scarino, outlines a set of pedagogical principles informed by collaborative action research across Australian schools. Their work highlights the importance of cultural responsiveness and co-designed curriculum in enabling deep intercultural learning.

In Chapter 8, Saioa Larraza and Leire Diaz-de-Gereñu investigate primary schools in the Basque Autonomous Community. Their investigation reveals that teachers embrace multilingualism even when tasked with preserving an endangered language. Chapter 9, by Adriana Diaz, rounds out this part with a compelling case for using open educational resources (OERs) in university Spanish courses. By drawing on frameworks such as critical pedagogy and decolonial theory, Diaz shows how OERs can empower students to critically reflect on language and identity.

Part Three (Chapters 10-13) examines the social realities that influence language learning and use. In Chapter 10, Yining Wang's ethnographic inquiry into Chinese immigrant children in Australia shows how family practices evolve over time to support heritage language maintenance, with children playing active roles in shaping these outcomes. Chapter 11, by Sviatlana Karpava, looks at Russian-speaking parents in Cyprus and how their engagement in their children's English learning is influenced by perceptions of academic and social mobility. Teachers and schools are shown to play crucial roles in supporting and validating this parental involvement.

Chapter 12, written by Kelechi Anusionwu and colleagues, reflects on international students' experiences in Estonia during the COVID-19 pandemic. Their findings speak to the importance of culturally sensitive online learning environments that consider learners' backgrounds, preferences, and identities. Finally, in Chapter 13, Giuseppe D'Orazzi explores how students in Australian universities construct their ideal multilingual and multicultural selves. The longitudinal study depicts how language learning is intrinsically tied to personal identity and intercultural awareness.

Taken together, the volume's three parts demonstrate a cohesive and comprehensive approach to examining multilingualism and multiculturalism. They span systems-level critique, classroom-based innovation, and community-driven insight, which delivers a rich and layered understanding of the challenges and opportunities that define this field today.

Critical evaluation

Reflecting on this collection, I greatly appreciate its balanced and evidence-informed approach – well-researched yet accessible and practical. Its standout strength lies in effectively bridging theory with real-world educational practices, which provides teaching practitioners, policymakers, and scholars with actionable insights. The wide range of international case studies is specifically commendable, as it accentuates the global nature of multilingualism and multiculturalism in education, showcasing comparative perspectives.

One of the most impressive aspects of this book is its practical orientation. Rather than merely identifying challenges, the contributors consistently offer well-considered pedagogical strategies and solutions. This solution-focused approach ensures the book's relevance not only as an academic text but also as a hands-on resource for educators in varied classroom environments.

The coherent organisation further enhances the volume's readability. Each chapter flows logically into the next, creating a cohesive narrative that reinforces key themes and allows readers to see the connections between policy, practice, and societal impact. The contributions have covered multifaceted contexts, both geographically and culturally, which draw our attention to universal challenges and unique local solutions.

Despite its strengths, the volume could benefit from a greater diversity of methodological approaches. Most contributions relied on qualitative case studies; and while these offer in-depth insights, incorporating quantitative or mixed-method research could have broadened their analytical reach. Additionally, the inclusion of discussions on integrating educational technology into multilingual education practices would enhance the book's contemporary relevance.

Compared to similar texts, Veliz's edited book stands out due to its clear structure, coherent narrative, and actionable recommendations. It transcends mere critique of existing problems, offering tangible and practical pedagogical strategies. This quality makes it especially valuable for those directly involved in education policy and classroom practice.

In conclusion, this volume convincingly underscores that multilingualism and multiculturalism are not merely aspirational but essential for equitable education. Achieving inclusivity is undoubtedly complex, but the book provides clear pathways toward meaningful progress. Future research should further explore the intersection of technology and multilingual education to support ongoing efforts toward truly inclusive educational environments.

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Book Review of Karl Christian Alvestad, Kari H. Nordberg and Hege Roll-Hansen (Eds., 2023). *New perspectives on educational resources: Learning materials beyond the traditional classroom.* Routledge.

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Introduction

While education certainly involves mere knowledge transmission, it is increasingly recognized as a dynamic process where creativity, collaboration, and critical thinking are paramount to the learning experience (Almazroa & Alotaibi, 2023). As conventional classroom materials often fall short of meeting contemporary pedagogical demands, scholarly attention is increasingly turning towards a richer array of educational resources beyond the confines of traditional textbooks and standardized curricula (Williamson, 2013). Consequently, education systems face an imperative to innovate and adapt, particularly in response to the complex global challenges that define our current era (Fan, 2025).

Responding directly to this imperative for educational evolution, their edited volume, *New Perspectives on Educational Resources: Learning Materials Beyond the Traditional Classroom*, Karl Christian Alvestad, Kari H. Nordberg, and Hege Roll-Hansen investigate how diverse learning materials (both digital and physical) can foster crucial twenty-first-century skills (Alvestad et al., 2023). The editors argue that these skills are not only vital for academic success but also instrumental in guiding students towards a future centered on well-being (OECD, 2019). Rooted in Scandinavian educational contexts, the work provides empirically grounded perspectives on innovative resource engagement by both educators and students. Moreover, by integrating insights from language studies, literature, history, and social studies, the book advances a compelling case for an expanded conception of what constitutes a valuable learning tool.

Central to this volume is its challenge to the prevailing notion that educational resources must be explicitly designed for teaching. Instead, the contributors argue that valuable learning materials frequently emerge in unexpected contexts, from historically significant objects and interactive digital platforms to the surrounding natural environment.

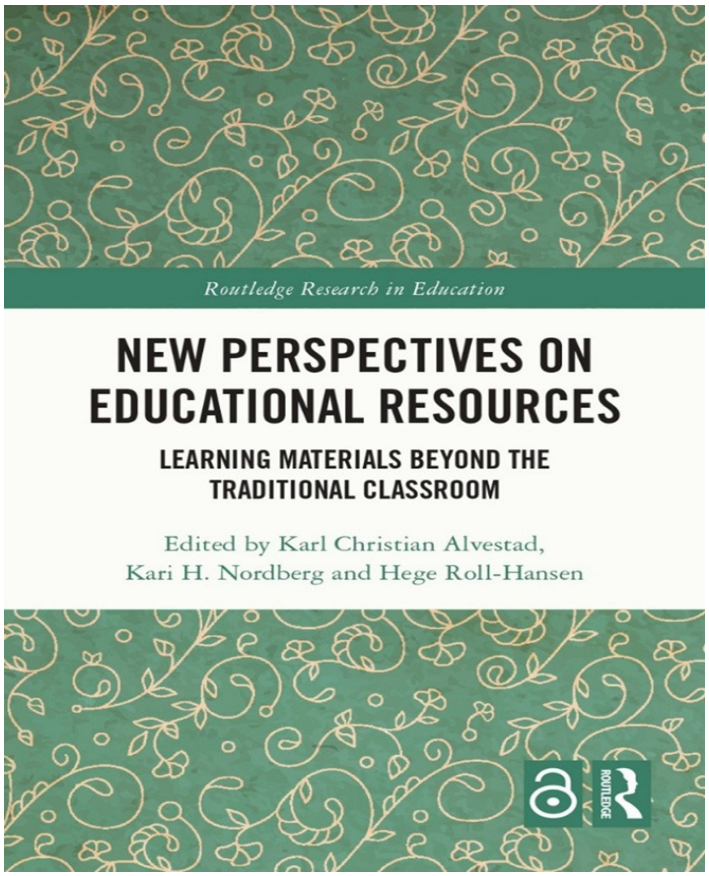

Figure 1. Book cover of Alvestad et al. 2023.

Such an interdisciplinary engagement with resources, the book posits, not only amplifies student involvement but also cultivates a more profound and reflective learning experience. At its core, the work champions an educational philosophy that nurtures the 'four Cs' (creativity, critical thinking, collaboration, and communication) by capitalizing on the richness of varied learning materials. Consequently, the volume advocates for a pedagogical shift away from rigid instructional models and towards more dynamic,

context-responsive resources that equip students for an interconnected world.

Crucially, the discussion transcends mere theory by offering concrete examples of these principles in action within Scandinavian classrooms. This practical grounding solidifies the work's status as a vital contribution to contemporary discourses in curriculum development, didactics, and educational technology. Through its synthesis of perspectives from researchers and practitioners, the volume serves as both a rigorous academic critique and an actionable guide for those seeking to reimagine education. Ultimately, the book prompts a profound reconsideration of learning's foundational elements, and underscores how our engagement with diverse materials (whether within or beyond the classroom) critically shapes not only our knowledge but also our identities as learners.

Overview

Imagine entering a classroom, a museum, or even strolling down a street, and suddenly perceiving that all surrounding elements possess inherent pedagogical potential. This very perspective is foundational to the volume under review, which explores in depth how learning materials (ranging from traditional artifacts to digital tools) are molded by historical, cultural, and technological forces. The era of education solely reliant on textbooks and blackboards is decidedly over. Indeed, as educational approaches increasingly embrace multisensory and multimodal experiences, learning environments must correspondingly adapt to reflect the complexity of real-world knowledge production (Latino & Tafuri, 2025). Learning, therefore, is a ubiquitous process, often occurring in unacknowledged ways. Yet, as the book rightly emphasizes, the mere availability of diverse materials does not guarantee meaningful learning; intentional pedagogical framing remains indispensable for guiding students to interpret and engage with these resources effectively (Chisunum & Nwadiokwu, 2024).

Organized into three distinct sections—Places, Activities and Artifacts, and New Media—the book systematically unpacks the evolving role of educational resources (Figure 2). It advocates an interdisciplinary methodology, synthesizing insights from pedagogy, history, sociology, and technology studies. This multifaceted lens proves vital for addressing contemporary educational challenges, such as the mediation of knowledge by digital tools and the influence of cultural artifacts on identity development. While the volume commendably broadens appreciation for contextually embedded learning, its introductory section could have offered a more incisive examination of accessibility issues and socio-economic disparities within educational technology. This critique is particularly pertinent as the ongoing expansion of the digital age has not resulted in equitable access to these innovations for all students. Furthermore, while the book poses compelling questions, it would have benefited from more explicitly delineating the specific contribution of each cited discipline to its overall analytical framework.

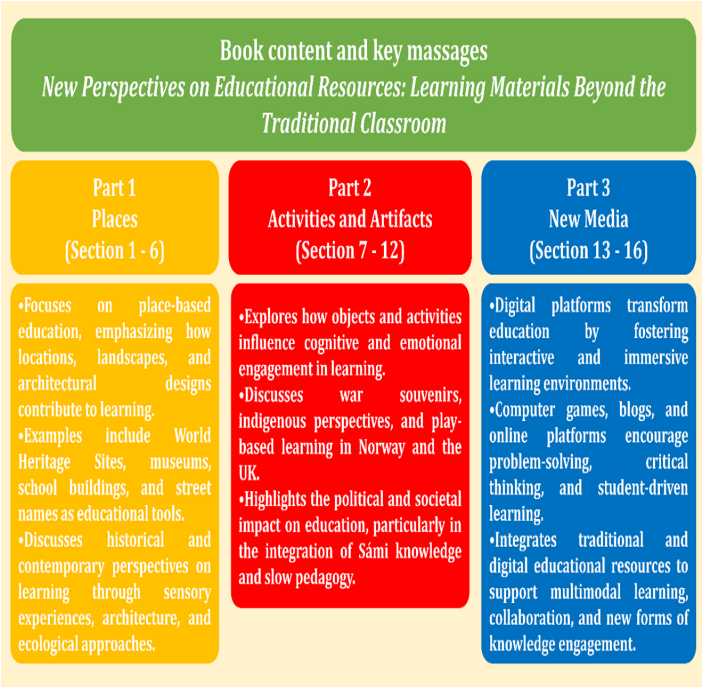

Figure 2. The book's contents and key messages.

A compelling case study in the book's initial chapter immerses readers in Norway's Rjukan–Notodden industrial heritage sites, where history becomes a lived experience. Through 'The Cultural Schoolbag' (TCS) initiative, students undertake period-specific activities, where performative learning makes knowledge acquisition an embodied experience, not just a cognitive one. This experiential approach aligns with constructivist theories emphasizing active engagement (Lebert & Vilarroya, 2024). Yet, the chapter seemingly overlooks pressing issues. Does its potential romanticization of the past, for instance, obscure industrial labor's harsh realities and related inequalities? Do highly structured re-enactments unduly limit students' critical historical engagement, risking mere performance? Critical pedagogy scholars (Zembylas, 2011) caution against 'pedagogical nostalgia' where sanitized re-enactments can mask structural injustices. Finally, the analysis would have benefited from exploring the model's adaptability to less resourced settings, e.g., how schools in underfunded or postcolonial contexts might replicate such immersive learning.

Transitioning from historical sites, the book next considers museums as unconventional learning spaces. For instance, the second chapter positions these institutions not merely as repositories of knowledge, but as potent catalysts for curiosity. According to the authors, museums cultivate this curiosity through rich sensory engagement and by encouraging counterfactual reasoning—*those* "what if" scenarios that encourage thinking beyond the immediately visible. This portrayal, however, raises a compelling dilemma: Can museums genuinely foster open-ended curiosity while operating within structured educational frameworks? While the chapter rightly acknowledges museums' participatory potential, it should have more critically examined inherent power dynamics, particularly how socio-economic status influences engagement, or how institutional authority shapes "valuable" knowledge. Furthermore, the analysis

would have gained depth from a comparative discussion of diverse museum archetypes, such as science centers versus history museums.

The book's exploration of learning environments extends from museums to architecture of educational institutions, highlighting that education is as much about its settings as its content. The third chapter examines two Scandinavian schools from the 1920s, designed to embody the ideals of Bildung (holistic intellectual and moral development). For instance, ELG in Norway, with its neoclassical "miniature Acropolis," aimed to symbolize civic virtue and democratic accessibility, whereas SHL in Sweden prioritized spiritual and humanistic cultivation. Yet, the chapter reveals that despite such ambitious architectural philosophies, both institutions encountered significant practical hurdles. This prompts profound questions explored by the chapter: Can architecture genuinely mold intellectual growth, or is it primarily as a performative symbol rather than a truly functional learning environment? Furthermore, how do national identity and ideology become embedded within the physical fabric of educational spaces? Perhaps a deeper engagement with spatial theory or phenomenology of space would have further illuminated these complex relationships.

The book then broadens its scope to examine how history and culture are inscribed within quotidian elements of the environment. The fourth chapter exemplifies this by examining street names, revealing them as potent, historical markers, presented as 'monuments in disguise' that embed cultural and political narratives into daily life. This concept is linked to Norway's LK20 curriculum, promoting local historical engagement. Nevertheless, the chapter's analysis insufficiently explores the inherently contested nature of street naming. As history is fluid—with names often altered by political realignments, social movements, and decolonization processes—a more thorough exploration was warranted. The discussion should have more robustly analyzed how street names function not merely as passive commemorations but as active arenas for contesting historical narratives. Perspectives from memory studies or critical geography, for instance, would have added further analytical depth.

Subsequently, the volume shifts to explore more personal and performative modes of educational engagement, a timely exploration given the constraints often felt in conventional learning environments. Among these, Iben Brinch's work, detailed in the fifth chapter, is particularly notable. It invites a departure from conventional confines, both physical and intellectual. She posits that writing transcends its function as a mere conduit for ideas to become a mode of thinking itself—a process integral to developing academic identity in novice scholars. This is vividly illustrated by her study of PhD students during the pandemic who, through reflective walking, photography, and writing about their surroundings, wove personal experience into scholarly discourse. Such exercises demonstrably fostered a sense of belonging while challenging traditional academic writing's perceived detachment and impersonality. This methodology resonates with autoethnographic approaches that validate lived experience as a legitimate source of academic inquiry (Le Roux, 2017). Brinch, however, commendably acknowledges inherent limitations, and raises critical questions: Can such deeply personal reflections uphold academic rigor? Moreover, does place-based writing inadvertently privilege individuals with access to inspiring environments, potentially marginalizing those in less conducive settings? These interrogations underscore a crucial tension between accessibility and intellectual freedom, a tension the book revisits.

Building on themes of place and accessibility, the book next explores learning's ecological dimension (Chapter 6). Inger Birkeland champions interdependence against the climate crisis, critiquing anthropocentrism and advocating a place-conscious pedagogy that acknowledges human-environment reciprocity to cultivate hope over student despair from current climate education. While vital, this approach is not without challenges. The chapter, for instance, could have more deeply examined formal education's structural impediments to such relational methodologies (Smith, 2013). Persistent questions remain regarding curricular integration and education's role against systemic ecological decline. Nonetheless, Birkeland's vision aligns with 'responsible knowing' (e.g., Lorraine Code and Isabel Stengers), defining learning as a co-evolutionary human-environment process.

The book then shifts from the natural environment to the personal realm of memory and materiality. Chapter 7 by Kerstin Bornholdt explores how historical objects can serve as learning tools. Her case study—a WWII soldier's Eiffel Tower, once a souvenir—reveals its transformation into a complex historical artifact. By engaging with such objects, students can bridge personal narratives with broader historical events, fostering empathy and critical thinking. Rooted in museum pedagogy, this method enables experiential rather than passive historical study. Yet, emotional connections to artifacts demand critical interrogation to mitigate nostalgia or bias (Zembylas, 2011). Key pedagogical challenges include ensuring personal artifacts enhance (not overshadow) historical analysis, and scaling this intimate methodology to broader curricula. Bornholdt's work thus underscores history's fluid meaning: a war memento reinterpreted as an educational tool.

Indigenous knowledge systems offer a critical lens for rethinking education, a theme the volume explores via Sámi perspectives shaping Norway's teacher education (Chapter 8). With global emphasis on twenty-first-century skills—collaboration, critical thinking, and cultural awareness—Norwegian teacher educators are increasingly turning to such guidance. A key autoethnographic project (USN) documents how engagement with indigenous literature fosters deep reflection and collective learning. Embracing "slow pedagogy," these educators prioritized meaningful engagement over productivity-driven efficiency. Resisting neoliberal pressures that frame education primarily as a competitive enterprise remains the key challenge. Can indigenous perspectives be genuinely integrated into mainstream teacher education, or will they remain largely tokenistic? Real transformation, the study suggests, requires vulnerability and the will to unlearn dominant worldviews—a process both difficult and necessary.

The challenge of understanding how dominant worldviews shape educational practices is compellingly addressed in the book's ensuing analysis of national policy discourses. In Chapter 9, Aye Thida Oo and Anders Davidsen employ Critical Policy Discourse Analysis to compare the framing of play-based learning (PBL) in early years education in Norway and England. Their analysis reveals distinct ideological underpinnings: in Norway, play is predominantly constructed as a child's intrinsic need and right, fostering academic skills via child agency rooted in Froebelian thought. Conversely, the English context, while also viewing PBL as instrumental for academic development, frames it more via adult-led guidance, shaped by neoliberal emphases on academic performance and school readiness. Exploring these discourses' impact on 21st-century skills, the chapter acknowledges benefits in both approaches while stressing the influence of national agendas and societal values on pedagogy. It further illuminates the persistent tension between child-led exploratory play and meeting academic preparedness demands in early childhood education.

These societal and ideological influences on pedagogy, previously discussed, are now cast into sharp historical relief in the next chapter. Merethe Roos, in Chapter 10 discussing a 1950s Norwegian language dispute, offers a historical vignette contextualizing a local newspaper debate within wider national and pedagogical currents. The chapter revisits Eidsvoll (1953), where Norwegian language variants (bokmål vs. nynorsk) in schools ignited controversy over critical thinking and student autonomy. This is exemplified by the conflict surrounding teacher Eivind Vågslid, whose nynorsk advocacy was seen as suppressing student engagement. By linking critics' arguments for linguistic freedom to reform pedagogy and critical thinking, Roos demonstrates current educational concerns' deep historical roots. This chapter compellingly shows educational resources are never neutral but are instead potent sites of ideological contestation regarding culture, identity, and the nature of learning.

The ideological charge inherent in educational resources, a theme underscored in the previous discussion, finds new expression as the volume turns to environmental engagement. Hege Roll-Hansen, in Chapter 11, meticulously details the shifting pedagogical, political, and ideological rationales for Norwegian schoolchildren's involvement in forestation projects from the late nineteenth century to the 1970s. She demonstrates how tree-planting was imbued with evolving societal values, from 'arbor day' movements (driven by deforestation and economic concerns) to post-WWII rebuilding, aided by materials like the *Skog*-ABC textbook. It traces a shift from early ecological awareness to a post-war, economically rationalized forest view, including problematic non-native species introductions. This historical perspective offers a valuable framework for contemporary environmental education, especially amidst the ecological crisis. It insightfully reveals both continuities in ecological concern and critical differences in framing human-nature relationships within teaching.

The volume's focus on diverse educational resources continues with an examination of a familiar, yet evolving, pedagogical tool: songs. In Chapter 12, Ragnhild Elisabeth Lund investigates their reinvention for contemporary English language learning (ELL) amidst new technologies. Her study offers valuable empirical data from a survey of 110 experienced Norwegian English teachers on their views and practices. Findings indicate a general teacher preference for songs, especially with younger learners, for language practice, vocabulary, and pronunciation, with increasing use of online platforms like YouTube. While cited benefits include motivation, Lund's research reveals that songs' full potential often remains unexploited due to a lack of explicit follow-up activities. The chapter highlights this potential-practice gap. Consequently, Lund suggests that more explicit teacher training on songs' pedagogical affordances is needed to innovatively leverage these familiar resources.

The volume's third part, 'New Media', addresses innovations like digital media. Chapter 13 (Kari H. Nordberg) addresses the challenging topic of teaching about pornography with historical depth and sensitivity. Her chapter on educational resources for this sensitive subject examines Norway's historical approach to sex education and material development dilemmas. The historical comparison Nordberg draws (between 1980s activism and contemporary approaches using guidebooks like Pornoprat) is illuminating. It highlights persistent challenges, such as representation (often leading to 'indirect' teaching) and the framing of youth as vulnerable. Nordberg also highlights the delicate balance educators must strike between fostering a non-shaming discourse and encouraging critical engagement with the pornography industry and rights, complicated by youth's online access. This crucial chapter underscores the enduring difficulty of resourcing such instruction amidst societal anxieties and student impact concerns.

Continuing Part III's new media exploration, the subsequent chapter shifts from online content challenges to the pedagogical potential of WWI video games in teacher education for fostering historical consciousness (Chapter 14, Brazier and Sandberg). Their insightful, theoretically robust chapter analyzes diverse game genres (e.g., strategy, FPS, adventure)—dissecting war portrayals, inherent biases, and gamic actions, and how to foster critical engagement. Grounding their analysis in theories of historical consciousness (Rüsen) and gamic action (Galloway), they emphasize engaging game mechanics and narrative structures—not merely content—to develop sophisticated historical understanding. A key contribution is 'teacher pro-action,' transforming gameplay into reflective historical inquiry. These games' varied perspectives offer opportunities to explore historical narratives, empathy, and critical thinking, providing a model for educators to meaningfully integrate games.

Continuing Part III's exploration of new media beyond games, Kari Anne Rustand, in Chapter 15, delves into informal online interactions by analyzing peer interaction roles in blog comment sections. Using Systemic Functional Linguistics (SFL), she scrutinizes comments from Norwegian L1 pre-teacher students on university course blogs. Rustand's findings identify varied positive student roles (e.g., advisor, supporter, knowledge sharer); interactions are generally characterized by benevolence and sharing. However, the study also notes that deep critical engagement or rigorous testing of theoretical concepts is less prominent.

The application of SFL provides a nuanced understanding of these interactional dynamics. Ultimately, Rustand proposes a framework to interpret these roles. She underscores their potential for developing vital communication skills and fostering collaborative learning—crucial 21st-century competencies. Her work offers valuable insights for educators on harnessing online peer dialogue for learning.

Part III's new media exploration concludes with a focus on student-led critical production of texts. Marthe Øidvin Burgess, in Chapter 16, explores 'redesign' as a classroom method to develop critical literacy in Norwegian upper secondary students. Drawing on social semiotics and critical literacy theory (Janks' model), the chapter examines student projects transforming stories into films or creating Instagram posts for Old Norse gods. While these cases demonstrate students' semiotic manipulation, Burgess argues that fully fostering critical literacy, educators must explicitly frame such activities critically. Crucially, she emphasizes the teacher's role guiding students to deconstruct their redesigned texts and analyze ideological implications. This focus on redesign's cyclical nature and the teacher's critical facilitation of meta-reflection offers insights for educators aiming to empower students as critical readers and producers of multimodal texts.

Drawing on approaches such as student-led redesign, this book presents a central provocation. It urges readers to critically re-examine where and how learning occurs. The volume shows education unfolding in often unrecognized ways—through industrial heritage sites, museums, school architecture, myth, film, or street narratives. While offering rich discussion, the book, as noted, occasionally hesitates at deeper critical engagement. Nonetheless, it sparks an essential contemporary conversation: Amidst rapid change, how can learning to remain accessible, inclusive, and critically attuned to history and society? Despite varied focal points, the collected chapters share a core conviction: learning transcends mere knowledge transmission, becoming a force shaping identity, fostering relationships, and enabling deep worldly engagement. Through explorations of reflective writing, ecological consciousness, historical artifacts, and indigenous epistemologies, its contributors collectively challenge established notions of learning itself. They powerfully remind us that impactful education features not by definitive answers but by generative questions—inquiries propelling learners beyond familiar horizons into transformative spaces.

Discussion and reflection

The generative questions and the call to explore transformative intellectual spaces, so powerfully evoked by *New Perspectives on Educational Resources*, prompt deeper reflection on education's historically defining foundational assumptions. A primary, often implicit, assumption has been that education is confined to its traditional physical spaces. For centuries, learning has largely been conceived as confined to classrooms, orchestrated by textbooks, structured curricula, and standardized evaluations. The present volume, however, compellingly invites transcending this conventional framework, urging a more expansive and dynamic conception of learning—one that permeates everyday life beyond formal institutions, transforming the world into a potential classroom. Such a perspective powerfully aligns with contemporary movements in place-based and situated learning, underscoring the deeply contextual nature of knowledge acquisition (Subramaniam, 2020).

Further aligning with contemporary thought on contextual learning, the volume's particular strength lies in its adept fusion of theoretical insights with palpable, lived experiences. The contributors do not simply advocate for pedagogical transformation; they vividly illustrate its potential through tangible scenarios. Whether envisioning a child learning history via digital simulation, a teenager understanding physics through skateboarding, or students engaging in profound discussions on online forums, such examples powerfully argue for a redefinition of educational resources. The book thereby challenges its readers to perceive learning not as a linear, curriculum-dictated process, but as an evolving, interactive journey shaped by context, curiosity, and technology. This emphasis on non-linear, emergent learning pathways resonates strongly with contemporary calls for adaptive, student-centered educational models (Toh, 2016).

The strong resonance of the volume's ideas with calls for adaptive, student-centered learning highlights not just their relevance but their distinct urgency in the current educational climate. In a world profoundly shaped by digital interactions and interdisciplinary modes of thought, the book's exploration of new learning spaces is timely and necessary. Nevertheless, while its conceptual depth is considerable, the volume occasionally prioritizes theoretical exploration over concrete application. Consequently, readers seeking explicit, step-by-step strategies to integrate these innovative ideas into formal educational settings may desire more direct guidance. Although the book excels at stimulating new perspectives and opening intellectual doors, it often entrusts practical implementation to the reader's interpretive efforts. This disjunction between visionary thinking and practical enactment, as Neil Selwyn notes regarding digital optimism, represents a persistent challenge in educational innovation (Selwyn, 2021).

Despite the aforementioned limitation regarding practical guidance, the strengths of this book considerably outweigh this concern. Unlike many works that concentrate exclusively on critiquing traditional education, this volume distinguishes itself by offering constructive alternatives and maintaining an optimistic, though realistic, view of the potential for change. Its narrative, artfully crafted by drawing upon a wide array of disciplines (the user should verify and specify these, e.g., pedagogy, sociology, media studies, etc.), achieves a compelling balance of intellectual rigor and profound human relevance. The book serves as a potent reminder that learning is not restricted to formal settings like classrooms, textbooks, or screens, but is intricately woven into the fabric of everyday existence. This interdisciplinary ethos resonates deeply with the broader shift towards complexity thinking in education, which views learning as a relational and emergent process (Davis & Sumara, 2014). Indeed, the volume exemplifies how interdisciplinary inquiries

yield vital insights into education. These insights, in turn, can inform the design of more integrative and interactive learning experiences, aligning with research championing problem-centered approaches for meaningful integration and constructive alignment (Klaassen, 2018).

Conclusion

Ultimately, *New Perspectives on Educational Resources* stands as a significant and intellectually stimulating contribution to the ongoing evolution of educational discourse. By boldly challenging the established boundaries of traditional learning environments, it extends a compelling invitation to educators, researchers, and policymakers to fundamentally reconsider how and where learning occurs. The volume effectively promotes contextual, interdisciplinary, and student-centered paradigms, articulating a vision of education that prioritizes adaptability, relevance, and the richness of human experience. While its profound theoretical explorations may, as noted, leave certain practical applications less detailed, the book's distinct power lies in its capacity to ignite critical reflection and forge new avenues for pedagogical innovation. It emphatically affirms that meaningful learning is not circumscribed by formal settings but is, instead, intricately interwoven with the complex tapestry of everyday life. Is this volume therefore recommended? Unequivocally. It is offered not as a prescriptive roadmap but as a powerful invitation to rethink, to experiment, and to embrace a more fluid and responsive educational philosophy. Rather than furnishing formulaic solutions, it inspires its audience to explore adaptive, context-driven models of learning, rendering it exceptionally valuable for those prepared to transcend conventional limits and envision new horizons for education.

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Book review of Bron Eager (2025). *AI-powered scholar: A beginner's guide to Artificial Intelligence for academic writing & research.* Routledge, New York.

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Introduction

Artificial intelligence (AI) and generative artificial intelligence (GAI) have become integral elements of higher education (Cotton et al., 2024; Ismail et al., 2023; Rudolph et al., 2025), widely utilized by graduate students, doctoral candidates, and lecturers. Despite this ubiquity, academics continue to engage in vigorous debates regarding AI's merits and limitations, primarily due to concerns about its potential to compromise the integrity of academic research and writing (Butson & Spronken-Smith, 2024; Wise et al., 2024). Even proponents who embrace AI as a support tool for academic research maintain a critical stance to avoid breaching scholarly ethics.

This critical yet balanced perspective forms the central thesis of Bron Eager's 2025 publication, "AI-Powered Scholar: A Beginner's Guide to Artificial Intelligence for Academic Writing & Research" (Figure 1). Eager, a senior lecturer at RMIT University in Australia, has established herself as a scholar who demystifies AI while inspiring others to explore its potential responsibly.

The book presents four key themes as part of a practical and comprehensive framework for academics seeking to enhance their scholarly performance (Figure 2). First, it establishes a fundamental understanding and contextual background of AI (Chapters 1-2 and 5). Second, it evaluates the essential skills required for effective communication and interaction with AI systems (Chapters 3 and 6). Third, it examines specific applications of AI in supporting research processes and scientific writing (Chapters 4 and 9-10). Finally, the book addresses critical considerations of ethics and creativity in AI implementation (Chapters 7-8 and 11).

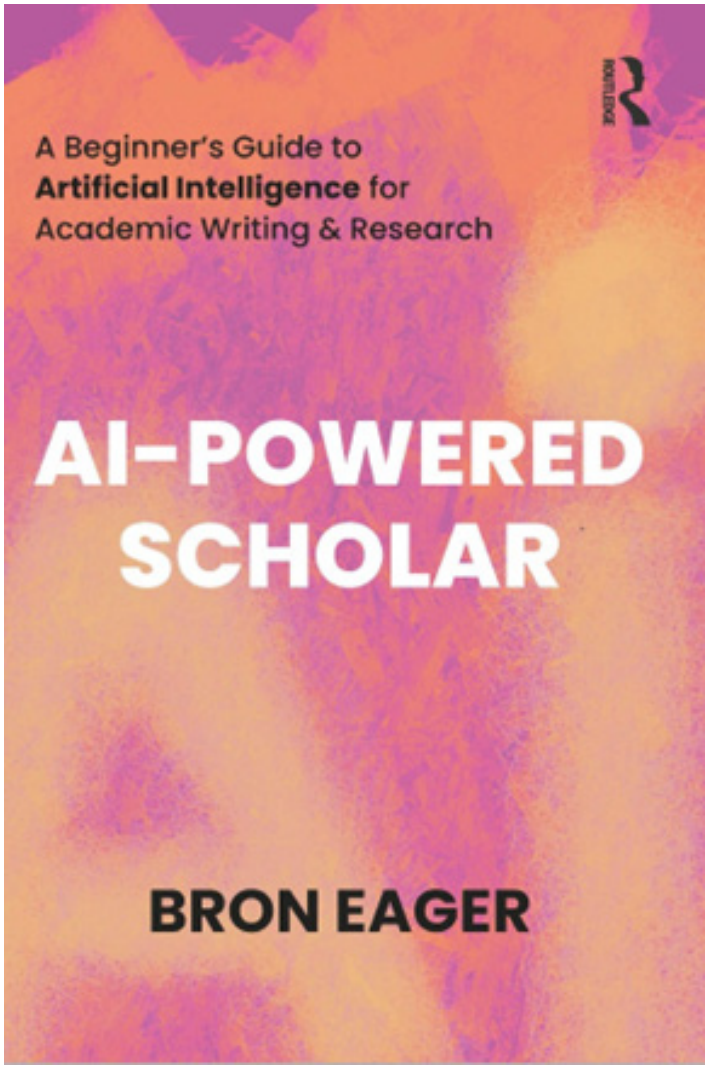

Figure 1: Book cover.

Overview

In Chapter 1, Bron Eager begins with an engaging personal narrative about her journey exploring AI, framing her work as a valuable resource for academics in higher education, particularly PhD students and lecturers, seeking to enhance their research performance and scientific writing responsibly. The discussion then transitions to examining the AI revolution with a specific focus on large language

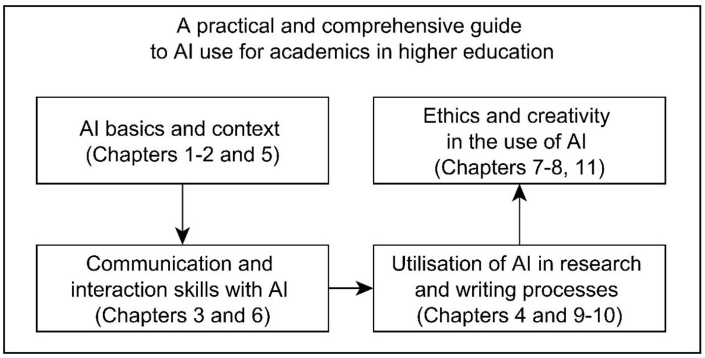

Figure 2: Four main aspects of the book.

model (LLM) tools capable of generating sophisticated, human-like texts (Chapter 2). By harnessing the capabilities of generative AI technologies such as ChatGPT, Claude, and similar platforms, the higher education sector stands at the threshold of a paradigm shift as these tools are increasingly integrated into various stages of academic work. Chapter 5 complements this contemporary perspective by providing a concise historical overview of conversational AI (chatbots) development from the 1960s through 2020.

Effective communication and interaction with AI systems are addressed in Chapter 3, where Eager explores strategies that render the experience both stimulating and occasionally challenging. This chapter introduces the concept of "loss in translation" as a framework for overcoming communicative barriers when engaging with AI. Since AI lacks the capacity to interpret non-verbal cues and integrate experiential knowledge that humans process intuitively, communication must be deliberately structured, breaking complex concepts into sequential, logical, precise, and unambiguous micro-instructions, while incorporating contextual explanations and illustrative examples. Chapter 6 extends this discussion by examining prompt engineering as an essential skill for effective AI interaction, detailing the components of well-crafted prompts, strategic writing approaches, and practical exercises for skill development.

The core contribution of the book is presented in the section addressing AI applications as an assistant in academic research and writing. Chapter 4 establishes the foundation for this implementation by exploring how to design and customize an ideal AI research assistant tailored to specific scholarly needs. Within the research workflow, literature searches represent a critical initial phase for topic identification and development. While traditional approaches typically rely on keyword-matching methodologies, Eager demonstrates how AI can optimize this process through semantic search capabilities that transcend the limitations of conventional search techniques (Chapter 9). Chapter 10 addresses the downstream components of the research cycle—manuscript writing and editing—introducing Eager's innovative "blah" writing technique, which transforms disorganized ideation into preliminary drafts characterized by structural coherence and logical narrative progression across paragraphs.

Ethics and creativity in AI utilization are examined in Chapter 7, which addresses the phenomenon of "hallucination"—instances where AI models generate plausible-sounding yet factually incorrect or nonsensical text. This issue presents particular challenges in academic contexts where factual accuracy is paramount. The chapter provides strategies for mitigating hallucination risks and algorithmic bias while maintaining data privacy standards. Chapter 8 explores methodologies for generating original research ideas through the "Five Whys" approach, demonstrating how AI can support rather than supplant creative scholarly inquiry. Chapter 11 supplements these discussions with curated online learning resources that extend beyond the book's contents.

Eager employs an accessible narrative style, which makes complex concepts comprehensible through engaging storytelling. She effectively illustrates ethical considerations by presenting scenarios involving a PhD candidate, a lecturer, and a professor, each navigating moral dilemmas regarding AI integration in academic work. A notable strength of the text lies in its interactive design, featuring reflection prompts, discussion columns, and experiential learning activities, including assignments, case studies, and role-play exercises that foster critical engagement with the material. However, the book has some limitations in its treatment of specific topics. The discussion of AI-assisted literature reviews (pp. 121-130) remains predominantly theoretical and could be strengthened by the inclusion of concrete, step-by-step examples. Furthermore, the absence of a practical compendium of sample prompt templates for generative AI applications creates uncertainty regarding implementation in authentic scholarly contexts. A minor yet noteworthy limitation is the omission of an index, which would have enhanced the reference value of the text by enabling the efficient location of specific information.

Discussion and reflection

The integration of AI in educational contexts presents novel opportunities, possibilities, and challenges (Ouyang & Jiao, 2021). Following the pandemic, AI utilization has become increasingly normalized within learning environments, with a growing number of students incorporating these technologies into their academic practices (Crawford et al., 2024). Postgraduate students, particularly doctoral candidates, and faculty members engaged in research and scholarly writing have embraced AI as a component of their academic workflow. The implementation of AI technologies offers diverse educational benefits, including enhanced student engagement, collaborative opportunities, and improved accessibility (Cotton et al., 2024).

While ChatGPT remains the predominant generative AI platform, alternatives such as Claude have emerged as viable options. Based on a comparative assessment evaluating effectiveness, accuracy, pedagogical alignment, and cultural appropriateness in foreign language composition, Claude's performance approximates human capability based on evaluations conducted by human instructors (Obaidoon & Wei, 2024). These findings may motivate academics to explore various generative AI systems for scholarly applications, recognizing each platform's distinctive advantages and constraints.

In practical application, researchers can employ AI to conduct narrative or traditional literature searches to identify contemporary research topics addressing current knowledge gaps. Our experiences with specialized AI research assistants such as Elicit have demonstrated promising results, enabling efficient summarization of findings in synthesized matrices. Nevertheless, when outputs appear incomplete or inconsistent with disciplinary expertise, rigorous verification during the process remains essential, with confirmation of accuracy through consultation of primary source materials.

Researchers have successfully integrated AI into systematic review methodologies by strategically combining ChatGPT capabilities with traditional human expertise throughout each phase of the review process (Alshami et al., 2023). In scientific writing contexts, AI can enhance scholarly productivity by fostering independent skill development, simplifying complex writing tasks (Karimi & Qadir, 2025), and providing more structured assistance than conventional word processing applications (Gayed et al., 2022). Additionally, the strategic integration of AI with human expertise can optimize the peer review process, maintaining efficiency while preserving contextual awareness and ethical judgment. Within this collaborative framework, identical manuscripts and evaluative criteria are presented to both AI systems and human reviewers. The AI-generated feedback, characterized by rapid processing and consistent application of criteria, is synthesized with human evaluators' nuanced contextual understanding and ethical discernment, yielding more comprehensive manuscript assessments (Farber, 2025).

As Eager emphasizes throughout her text, research ethics constitutes a fundamental pillar of the research trinity, inextricably linked with research integrity and governance. Research integrity represents a social virtue grounded in commitment to epistemological and moral principles. This pillar centers on the character and consequent responsibilities of the researcher (Kolstoe & Pugh, 2023), including ethical implementation of AI as an assistive tool in research and scholarly writing (Khalifa & Albadawy, 2024).

The critical challenge confronting academics, therefore, is to employ AI judiciously, moving beyond the AI-directed paradigm where scholars function merely as passive recipients. Instead, AI implementation should progress toward AI-supported and AI-empowered paradigms, positioning academics as active collaborators and learning agents in the technological interface (Ouyang & Jiao, 2021). However, scholars must resist attributing inherent autonomy, intelligence, or objectivity to AI systems. These technologies remain products of human innovation; their operational parameters necessarily reflect the human intelligence that designs and controls them. Indeed, these technologies frequently exacerbate existing social inequalities, environmental degradation, and workforce precarity (Rudolph et al., 2025). Educational institutions can address these challenges through proactive policy development and implementation (Cotton et al., 2024).

Conclusion

The integration of AI within academic environments represents a significant advancement that can enhance scholarly productivity through efficient and consistent task completion. Nevertheless, judicious implementation remains essential to avoid compromising scientific ethics or developing excessive technological dependence. Academics must therefore adopt an active rather than passive stance toward AI integration, leveraging these tools to augment their scholarly capabilities while maintaining critical disciplinary expertise. Rather than functioning as mere consumers of AI-generated content, scholars should develop collaborative workflows wherein AI enhances human capabilities while preserving the centrality of human judgment, creativity, and domain knowledge in academic inquiry. This book merits attention from diverse stakeholders, including students, faculty, institutional administrators, and educational policymakers, seeking to deepen their understanding of AI's role in educational contexts. With such informed engagement, AI can be utilized with the critical perspective necessary for responsible implementation.

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Book review of Leo McCann, Ödül Bozkurt, Rachael Finn, Edward Granter, Carolyn Hunter, Nina Kivinen, Arun Kumar, & Brian Wierman (Eds., 2025). *Elgar Encyclopedia of Critical Management Studies*. Edward Elgar.

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Introduction

McCann et al.'s *Elgar Encyclopedia of Critical Management Studies* is a substantial undertaking that totals 546 pages in a two-column layout. It is part of the *Elgar Encyclopedias in Business and Management* series. The Encyclopaedia assembles 119 alphabetically arranged entries—from *Affect through to Writing Differently*—written by a notably broad collective of 132 contributors. Edited by Leo McCann, Ödül Bozkurt, Rachael Finn, Edward Granter, Carolyn Hunter, Nina Kivinen, Arun Kumar and Brian Wierman, the team brings intellectual range, editorial assurance, and an international perspective.

Laudably, the editors embrace the pluralism that can be found in Critical Management Studies (CMS): they sought breadth across topics and voices, pairing established figures with emerging scholars, and applied a light editorial touch to preserve distinct perspectives. After four years of coordination and drafting, the outcome is an intentionally varied, expansive, and timely map of a heterogeneous field. In scope and self-understanding, the Encyclopaedia maps the CMS terrain without pretending to resolve its arguments. Classic touchstones (class, critical theory, bureaucracy, labour process) sit alongside newer preoccupations (critical diversity studies, hauntology, modern slavery) and reflexive entries on CMS's own trajectories and critics. Methods- and style-oriented pieces (for instance, autoethnography, ethnography, 'writing differently') round out the mix. The result is a one-volume snapshot of what CMS has become: diverse, vigorously contested, and reflexive about its own boundaries.

CMS starts from an unfashionable yet important premise: much of mainstream management scholarship is narrow, technocratic and too often legitimises the harms produced by contemporary capitalism. Claims to managerial neutrality ring hollow. Management is a political practice that, in the aggregate, protects incumbents and reproduces inequality. In a period marked by widening disparities, conflict and exclusion, CMS insists on examining how management—as a profession, interest bloc and academic discipline—helps

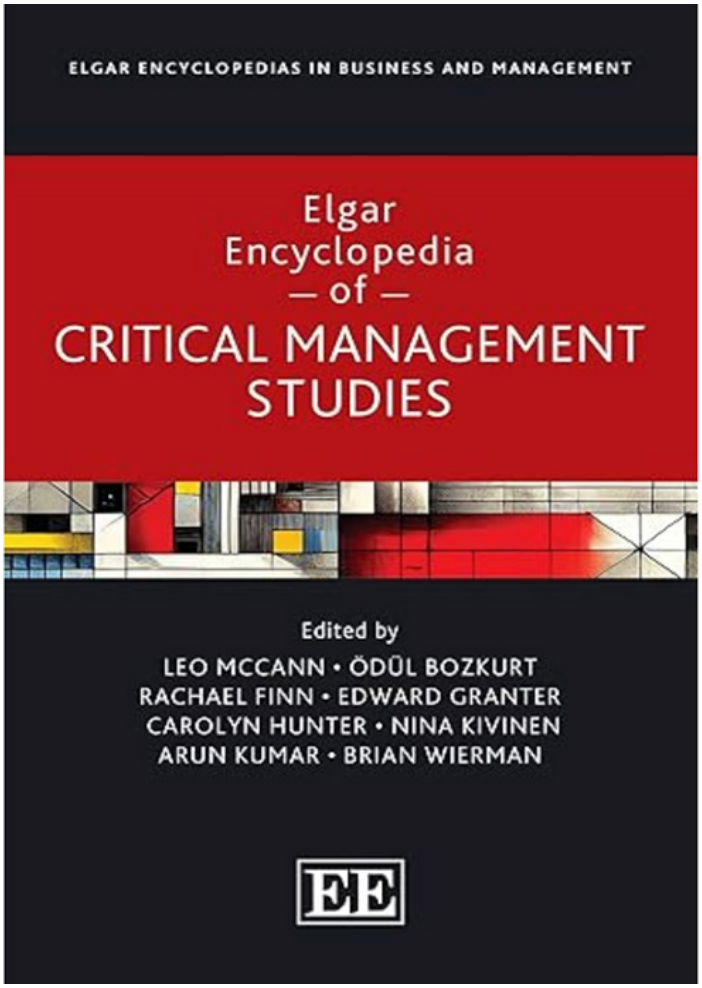

Figure 1: Book cover.

stabilise the status quo.

That insistence is hardly convenient in a 'post-truth' climate where parts of the right-wing media caricature universities as 'woke' citadels. Yet CMS has to some extent shaped teaching and scholarship—from gender, race and whistleblowing to toxic leadership, climate change, colonialism, global power relations, multinational corporate

conduct, management education, industrial relations and technological change. Intellectually, it sits alongside other 'critical' traditions (Critical Race Theory, critical sociology, Critical Theory), whose very prominence continues to attract concerted attack. The Encyclopaedia itself has entries on critical accounting, critical diversity studies, critical human resource management, critical leadership studies, critical military studies, critical pedagogy, and critical university studies (amongst others).

In case it needs explaining: Reviewing a CMS encyclopaedia in the Journal of Applied Learning and Teaching is warranted because, combined with critical pedagogy, it becomes a transformative toolkit for management education. CMS challenges mechanistic, hierarchical, technocratic models that naturalise the corporate–state order. Critical pedagogy (see the Encyclopaedia entry) supplies the praxis—problem-posing dialogue, co-designed assessments, and reflexive writing—that redistributes voice in the classroom and rehearses democratic decision-making for organisational life. Together, CMS and critical pedagogy reframe cases, discussions and briefs around power, externalities, labour, bureaucracy, modern slavery and 'writing differently', align with core learning outcomes (critical thinking, ethical reasoning, systems thinking, reflexivity), and travel across disciplines, from nursing to computing. The Encyclopaedia surfaces the hidden curriculum of power (audit culture; platformisation of higher education) and is timely in the AI/metrics age, asking who benefits, who pays, and what is rendered invisible. Integrating critical pedagogy within CMS is not optional—it is a precondition for credible claims to a responsible management education. While the whole content of the Encyclopaedia can be meaningfully used in higher education, depending on what you're teaching, I will highlight some of the more direct relationships between CMS and higher education in the following section.

CMS and higher education

Several of the Encyclopaedia's contributions speak directly to education. There are excellent entries on Business Schools and Management Education, Critical Pedagogy, Critical University Studies, the Establishment of CMS as a Discipline, and Responsible Management Education.

The Critical University Studies chapter reminds us that across the Americas, Europe, South Africa, East Asia and Australasia, market-oriented reform has entrenched managerialism. Universities are nudged from scholarly purposes toward management imperatives—restructuring, cost-cutting, performance indicators and compliance regimes. Audit cultures and workload intensification coincide with deteriorating staff wellbeing. Since the early 2000s, digital platforms have further recast pedagogy, curricula and academic roles. Academic freedom is squeezed by political and reputational risk-management, with a noticeable chill over gender studies, postcolonial and race-critical scholarship, CMS included. The Critical University Studies entry asks the question that should be on the mind of any educator: are universities custodians of knowledge and democratic life, or auxiliaries to market needs?

Martin Parker's chapter on business schools and management education is perhaps my favourite entry. This may well be due to personal bias and the halo effect, as I have read much of his outstanding work, reviewed his *Shut down the Business School* (Parker, 2018; Rudolph, 2018) and interviewed him (Parker et al., 2021). Parker acknowledges that the growth of CMS has been underpinned by the expansion of business schools in north-western Europe. Shut down the business school, and in many universities, CMS would be shuttered.

When reflecting on the current state of university affairs, it is useful to go back in history. Medieval universities depended on princely and episcopal patronage. Curricula were refracted through theology, and the wealthy were flattered in stone, portrait and syllabus. Today's equivalent is the business school's utilitarian promise. As a global product, business and management education now generates an estimated US$400 billion annually in fee income across 13,000+ schools, with international students subsidising the wider university. Parker puts it bluntly: the university's claim to universalism is now subsidised by a single profitable subsystem.

That fiscal reality has smoothed the shift to corporatisation. Without it, radical cuts to government grants might have been politically impossible. Business school logics now permeate institutional corridors, and the very dominance that keeps the lights on risks hollowing out the idea of the university. In the overwhelming majority of programmes, most of the time, students are drilled in digital marketing, analytics, capital markets, branding, strategic human resource management and 'innovation', with scant engagement with political economy or the planetary boundaries within which any economy must operate. Perhaps it is time, as Parker suggests, to "shatter the glass atriums" (p. 47) and teach for modesty and historical understanding alongside domain expertise.

Fittingly, the Encyclopaedia refuses to naturalise its own foundations. The entry on the Establishment of CMS as a Discipline foregrounds CMS's methodological scepticism: orthodox claims to objectivity and neutrality are critiqued, with researcher beliefs, positions and behaviours treated not as contaminants but as part and parcel of the evidentiary field. Some contributors extend the critique to the research infrastructure itself—publish-or-perish metrics, disciplinary silos and hyper specialisation—posing a disquieting question: if a field unsettles the criteria by which disciplines are constituted, can it, or should it, call itself one?

Finally, Responsible Management Education (RME) synthesises a practical agenda. If business schools are to claim leadership formation rather than mere credentialing, they must align teaching, research and dialogue to develop graduates capable of generating sustainable value for business, society, and the environment. That is not a simple pivot. League tables reward graduate salaries; research assessment often privileges positivist, quantitative work; and institutional incentives tilt against slow, reflexive pedagogy. Yet the RME entry sets out a pathway that academics can engage with immediately: design assessments that foreground social responsibility, embed critical literacies around power and inequality, and treat environmental limits

as non-optional and constitutive of managerial reasoning. The Encyclopaedia thus offers its readers not only diagnoses worth debating but also footholds for practice.

Some cherry-picking

Of the 119 entries, "Hauntology" was new to me. Coined by Jacques Derrida (2006), the term puns on the near-homophony of "ontology" and "hauntology" (from haunting) to argue that the present is never self-contained, as it is threaded with traces of pasts and unrealised futures. In Derrida's *Specters of Marx*, the 'ghost' serves to model a non-linear history and the persistence of Marxism despite liberal-capitalist triumphalism. As a lens, hauntology aims to unsettle claims to solidity and necessity, surface the politics of what passes as 'natural', and question growth-and-progress narratives by keeping past, present and future in view.

Speaking of ghosts: unsurprisingly, Marx's spectre is never far in this Encyclopaedia, and the index alone sends one across more than two dozen pages. Personally, I have little patience for state communism or its apologias—and neither did major critical theorists. For instance, Marcuse (1985) mounted a sustained critique of the Soviet system, and Fromm contrasts "the real Marx, the radical humanist" with "the vulgar forgery presented by Soviet communism" and argues that state totalitarianism leaves the worker "in bondage" (1976, p. 25; 1956, p. 285).

Marx's early writings, however, remain a useful point of entry into the humanist core of his project, where alienation, labour, and 'species-being' (*Gattungswesen*—Marx's term for the human essence as our social capacity to transform the world through free, creative labour and to recognise ourselves in others) are framed not as dogma but as questions (Marx, 2007). The Encyclopaedia entry on Creativity notes that Marx saw creativity and artistry as defining human capacities, and his theory of alienation partly explains how capitalism constrains workers' innate creativity. My favourite Marx quote is his resisting the catechism built in his name: "Ce qu'il y a de certain c'est que moi, je ne suis pas Marxiste" [If anything is certain, it is that I myself am not a Marxist] (cited in Engels, 1882, p. 353). It is a salutary reminder that any serious engagement with Marx should be unsentimental, historically grounded and open to revision.

In that spirit, the Encyclopaedia's chapter on Marxism and Critical Management Studies is well-judged. The relationship between Marxism and CMS remains uneasy and unfinished. The second wave of CMS often policed even faintly Marxist perspectives. Karakilic, the author of the "Marxism and Critical Management Studies" entry, however, argues that Marxism is not a fixed bundle of doctrines, methods or party lines, but a living, evolving tradition. Perhaps with Marx's (1845, p. 145) 11th Feuerbach thesis in mind ("The philosophers have only interpreted the world, in various ways; the point is to change it"), Parker is cited at his most sceptical: "There is, to my knowledge, no evidence that any of the core work within CMS has made any substantial difference to the wider world" (Parker, 2023, p. 59).

I enjoyed the entry on Critical Theory and CMS. Seymour and Granter frame Frankfurt School Critical Theory in three generations, each shaped by different contexts, methods and diagnoses. The core of the first generation comprises Adorno, Horkheimer and Marcuse, who analysed capitalist societies as structured by domination and inequality and retained a Marxian hope for less alienated forms of production and life. CMS drew on this tradition from the outset, notably in Alvesson's and Willmott's work. The second generation centres on Jürgen Habermas, who accepted many early diagnoses of fascism, consumerism, nationalism and instrumental rationality, yet defended the unfinished project of modernity through communicative rationality and warned that systems imperatives colonise our lifeworld. A third generation is associated with Axel Honneth's theory of recognition, which rejects first-generation negativism while arguing that Habermas's model misses the lived moral experiences of individuals. When I studied Sociology in Germany in the 1980s, the Frankfurt School critical theorists were some of my heroes, and writing our recent book on Teaching well (Brookfield et al., 2023) was a welcome opportunity to revisit some of their writings.

Both Marcuse and Angela Davis stress that critical theory must be self-critical (Davis, 1989; Brookfield, 2005). In the Encyclopaedia, this is also applied to CMS in a remarkable article titled Critiques of CMS. Klikauer and Campbell argue that CMS proclaims distance from mainstream management yet largely operates within it. They note frequent claims of Frankfurt School lineage but judge CMS far from Critical Theory's horizon of universal emancipation. They argue that CMS pursues micro-emancipation: better managers, fairer organisations, incremental fixes that stabilise rather than transform. Klikauer and Campbell posit that CMS functions as a junior partner to traditional management studies, offering system-stabilising "crypto-critique" (p. 152). By contrast, the Frankfurt School of Critical Theory treats management as inherently reproducing domination.

Other articles that I found fascinating are the ones on Corporate violence, Gaslighting ("a tactic of psychological manipulation intended to make someone seem or feel 'crazy', to make them question the legitimacy of their feelings and experiences" (p. 224)), Necrocapitalism ("contemporary forms of organizational accumulation that involve dispossession and the subjugation of life to the power of death" (Banerjee, 2008, p. 1541)), and Obedience.

Critical considerations

This is a wonderful book. However, an *Encyclopedia of Critical Management Studies* must be read critically, or the reader misses the point. My critical points are very minor when compared to the tremendous value this Encyclopaedia offers. Here they are. Some of the entries could have had more references—for instance, Martin Parker's outstanding entry on Business schools and management education. Due to the editors' admittedly light touch, the number of references per article can differ vastly. Also, the index could have been more detailed, especially when it comes to authors. For instance, Alvesson and other CMS gurus do not have entries in the index, though they are referred to

numerous times throughout the Encyclopaedia. There could have been more entries on the role of technology, such as AI, though there are entries on Big Data, Digital nomadism, Fordism, Gig economy, Hackers, Post-industrial society, and Surveillance, amongst others. Another issue is the high price: the hardback is listed at £265 (Elgar member price £238.50), with e-book options starting at £48. The pricing signals a library-first positioning, while the digital option lowers the barrier for individual scholars.

The chapter that I looked forward to reading the most, "Music and Revolution", was the one that disappointed me the most. I should stress that this is less the authors' fault, and more due to my long-standing interest in this topic. Jensen and Zawadki's entry opens with real promise—Nietzsche's Dionysian energies, Wagner's total artwork, Marcuse's indictment of one-dimensionality—before pivoting to MC5 and a sharp line on capitalism's "destructive arrhythmia" (p. 321). But as I read on, the examples became increasingly one-sided (AC/DC, The Stooges' Iggy Pop, and Slayer), and I missed elements I take to be central to any serious discussion of music and emancipatory politics. A brief nod to the Palestinian critic Edward Said and the Israeli conductor and concert pianist Daniel Barenboim, and to their Barenboim–Said Akademie in Berlin, for instance, would have shown how musical practice can serve as a space for intercultural communication, bringing together Arab and Jewish musicians with their German peers (Barenboim & Said, 2002; Ismail et al., 2024).

A highly suitable conceptual touchstone for the "Music and Revolution" chapter would have been Adorno. Music does not make revolutions. It resists by form (Adorno, 1997, 2006). Works that refuse reconciliation through dissonance, fracture, and structural intransigence make audible the unreconciled within a damaged world, and keep open the thought that things could be otherwise. 'Committed' music that foregrounds a message risks sliding into illustration, forfeiting the negativity that constitutes critique (Adorno, 1997). Under the culture industry, even protest styles are standardised and repackaged, training listeners toward passivity and producing what Adorno called a regression of listening (Adorno & Horkheimer, 2002; Adorno, 2002). The political task is not to moralise art but to cultivate listening as critical practice (Adorno, 1997, 2002).

In this context, it is worth recalling that so-called 'classical music' has, at times, sparked genuine public turmoil. On the eve of the First World War, two premieres stand out. In Paris on 29 May 1913, Stravinsky's Rite of Spring caused a near-riot. Its performance met sustained booing, shouting and scuffles (Caddy, 2025). One month earlier in Vienna, the so-called *Skandalkonzert* ("scandal concert") collapsed during Alban Berg's *Altenberg-Lieder*, with fistfights, a halted performance and a lawsuit that bequeathed the *Watschenkonzert* ("slap concert") label (Calico, 2017). In the 1920s, George Antheil's Paris recitals courted and received well-documented unruly responses, while his famous pistol-on-the-piano flourish appears to be his own mythmaking (Antheil, 1945; Whitesitt, 1983). Even in 1973, Steve Reich's *Four Organs* at Carnegie Hall provoked shouts and attempts to stop the performance, a late-modern reminder that form alone can unsettle a trained audience (Reich, 2002).

Conclusion

Reading the Encyclopaedia alongside an MBA module on Business, Society, and the Environment and while drafting work on AI and leadership, made its utility obvious. Entries on Animals, Anthropocene, Critical Leadership Studies, Posthumanism, Power, Resistance, Sustainability, and Toxic leadership offered compact orientations with useful bibliographies to improve slide decks and the content of my writing. The book does what a field guide should do: it maps contested ground without smoothing it over and invites readers to test ideas in practice.

There are blemishes—uneven referencing, an index thin on authors, and a high price—but the strengths far outweigh them. If you teach or research business and management, this is the best single-volume reference for CMS. I highly recommend the book for critical reading. It supports redesigns of modules, anchors discussions of power and inequality, and keeps planetary boundaries at the centre of managerial reasoning. My verdict is simple: secure access and use it. Buy it if you can. Borrow it if you must. Just make sure you read this impressive and important Encyclopaedia.

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