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**GENERATIVE ARTIFICIAL INTELLIGENCE AND ACADEMIC
WRITING IN HIGHER EDUCATION: OPPORTUNITIES AND
CHALLENGES**

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Abstract

The rapid integration of Generative Artificial Intelligence (GenAI) into higher education has fundamentally transformed academic writing practices, creating both unprecedented opportunities and significant systemic challenges. This review synthesizes empirical literature, systematic reviews, and global policy frameworks published between 2023 and 2026 to critically evaluate the impact of GenAI on scholarly communication and pedagogical practice. Drawing on conceptual paradigms distinguishing assistive from substitutive AI deployment, the analysis reveals that GenAI offers substantial benefits including enhanced writing efficiency, cognitive scaffolding, linguistic democratization for non-native English speakers, and immediate formative feedback mechanisms. However, these opportunities are counterbalanced by severe risks: fabricated citations and hallucinations that compromise academic integrity, epistemic drift and cognitive atrophy resulting from overreliance on algorithmic output, unreliable AI detection tools that disproportionately flag writing from multilingual scholars, and algorithmic biases that perpetuate systemic inequities. The review examines institutional governance responses, particularly UNESCO's human-centered frameworks and the Traffic Light Model for assessment redesign, which establish operational zones for AI integration while protecting human agency and educational equity. Critical AI literacy emerges as an essential prerequisite for sustainable implementation. Geographic evidence skews heavily toward well-resourced, English-medium institutions, revealing urgent research gaps in Global South contexts, postgraduate cohorts, and longitudinal methodologies. The synthesis concludes that GenAI represents not a simple pedagogical solution nor an existential threat, but rather a systemic force requiring deliberate, evidence-based governance to ensure technology serves rather than supplants human intellectual development in academic writing.

Keywords: Generative Artificial Intelligence, Academic Writing, Higher Education, Large Language Models, Cognitive Scaffolding, Academic Integrity, UNESCO Policy Frameworks, AI Literacy

INTRODUCTION

The rapid emergence and widespread adoption of Generative Artificial Intelligence (GenAI) powered by Large Language Models (LLMs) such as OpenAI's ChatGPT, Google's Gemini, and advanced transformer architectures has initiated a profound structural paradigm shift across global higher education. Within scholarly communication and higher education pedagogy, academic writing occupies a central position. It functions simultaneously as a primary modality for knowledge construction, a vehicle for disciplinary socialisation, and the standard metric for assessing high-level cognitive mastery (Akhtar, 2024). The integration of GenAI into this domain has introduced unprecedented capabilities, enabling natural language interfaces to generate structurally coherent essays, summarize extensive bodies of literature, rephrase complex arguments, and translate across languages with high mechanical fluency (Golec & Hachaj, 2025).

However, the speed of GenAI adoption has generated a significant institutional contradiction: writing practices among students and faculty are evolving far faster than evidence-based pedagogical guidance or administrative regulatory frameworks can be developed. Higher education institutions find themselves in a position where empirical practice operates well ahead of empirical proof (Hamaniuk et al., 2025). While

early educational responses ranged from alarmist bans to uncritical enthusiasm, recent research syntheses reveal a more complex reality. GenAI is neither a simple cheating mechanism nor a universal pedagogical solution; rather, it represents a systemic force that is actively reconfiguring the cognitive, social, and ethical dimensions of academic authorship (Sidorkin, 2026).

This review synthesizes findings from empirical literature, systematic reviews, and policy frameworks published between 2023 and 2026. By synthesizing scoping reviews, qualitative analyses, and global institutional guidelines including those issued by UNESCO this article evaluates the opportunities, systemic risks, and governance frameworks surrounding GenAI in higher education writing (Bullock et al., 2021). Ultimately, the emerging evidence points toward an *assistive*, rather than *substitutive*, paradigm: GenAI is most effective when deployed as a cognitive and metacognitive scaffold that complements human judgment, critical interrogation, and argumentative synthesis (Wamba-Taguimdje et al., 2026).

2. Conceptual Paradigms and Pedagogical Scaffolding

To evaluate the operational impact of GenAI on academic writing, it is necessary to establish a precise conceptual framework that distinguishes generative systems from legacy writing technologies. Unlike traditional spell-checkers, reference managers, or rule-based grammar tools, GenAI systems utilize natural language processing (NLP) applied to deep transformer neural networks. These architectures predict probabilistic token sequences to generate novel textual compositions based on user-supplied prompts, eliminating the requirement for specialized coding expertise (Dogru et al., 2026).

Within higher education pedagogy, the deployment of GenAI in academic writing can be categorized along a spectrum anchored by two opposing operational postures: the substitutive posture and the assistive posture (Zaheer et al., 2025).

In an unscaffolded environment, the substitutive posture emerges when writers delegate primary cognitive functions such as thesis formulation, source interrogation, thematic synthesis, and structural drafting to the generative algorithm. In this dynamic, the student or researcher functions merely as an editor of machine output, leading to severe risks of cognitive offloading, diminished critical reasoning, and the erosion of authentic authorship (Martin, 2026).

Conversely, under a scaffolded, human-centered pedagogical framework, the assistive posture positions GenAI as an interactive dialogic partner. The technology offers cognitive and metacognitive support across the writing continuum from pre-writing ideation and outline generation to structural refinement and stylistic polishing while human reasoning retains total control over argument validity, empirical verification, and ethical accountability (Stacchio et al., 2026).

Empirical syntheses utilizing Population-Concept-Context (PCC) frameworks and PRISMA procedures demonstrate that when GenAI is positioned as an assistive scaffold, it directly interfaces with the cognitive phases of academic writing: pre-writing, drafting, revising, and editing (Aljuhani et al., 2026). The system provides immediate feedback loops that allow writers to test ideas, iterate on structural organization, and rephrase ambiguous passages. However, sustaining this assistive posture requires deliberate pedagogical design and explicit AI literacy, without which student practice easily degrades into substitutive overreliance (Zhang et al., 2023).

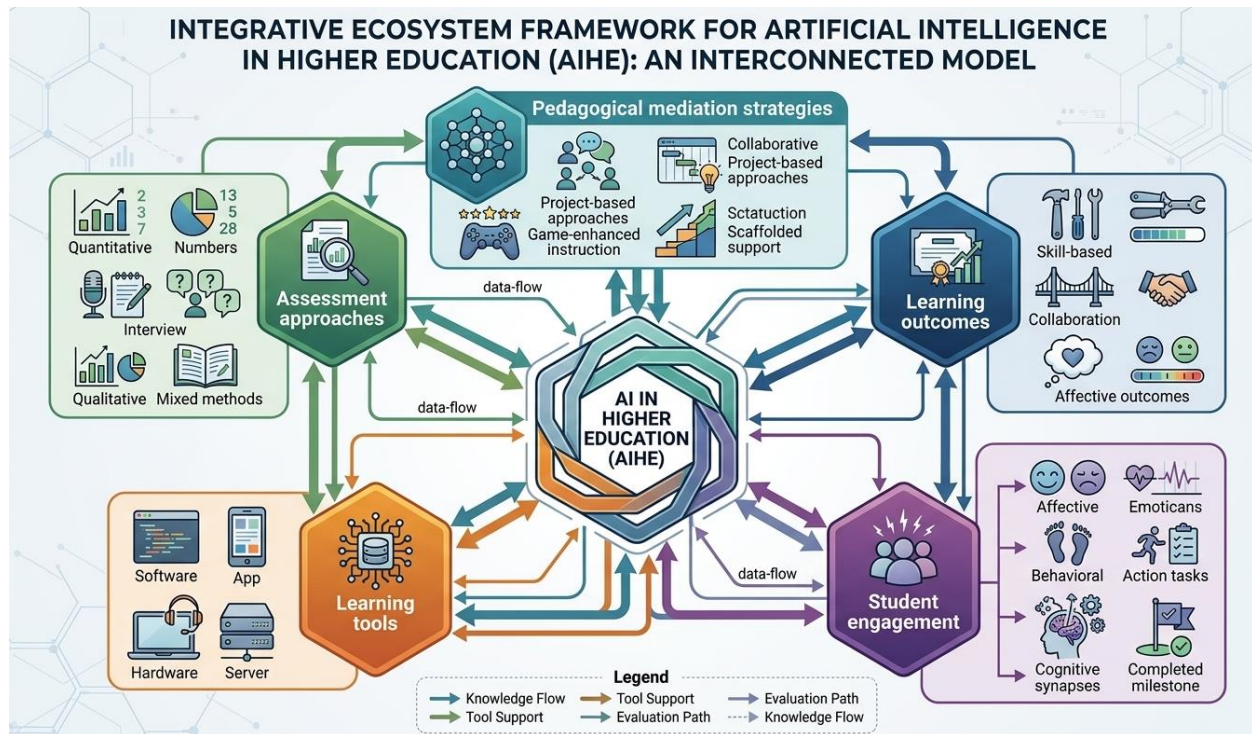


Figure 1. An Integrative Ecosystem Framework for Artificial Intelligence in Higher Education (AIHE): Interconnected Pedagogical, Technical, and Assessment Dynamics.

3. Opportunities: Enhancing Process, Proficiency, and Inclusivity

Empirical evaluations across diverse university cohorts indicate that GenAI offers substantial opportunities to support academic writing workflows, improve linguistic performance, and foster educational equity. These benefits cluster primarily around process-level scaffolding, linguistic democratization, and feedback efficiency (Hon, 2026).

3.1 Process Efficiency and Cognitive Support

Academic writing is a cognitively demanding task that requires the simultaneous management of low-level mechanics (grammar, syntax, spelling) and high-level cognitive tasks (conceptualization, argumentation, synthesis). GenAI tools provide significant cognitive relief by assisting with pre-writing organizational planning. Research shows that students and scholars frequently utilize LLMs to break down complex research questions, outline essay structures, generate preliminary hypotheses, and rephrase dense textual material (Drijbooms, 2016).

By offloading initial brainstorming and structural organizing to an interactive model, writers can overcome starting inertia and reduce the cognitive burden associated with initial drafting. During the editing phase, LLMs improve text clarity, cohesion, precision, and stylistic engagement. Experimental studies involving English as a Foreign Language (EFL) learners demonstrate that AI-assisted instruction yields statistically significant improvements in writing organization, vocabulary variety, and essay coherence compared to

traditional control groups (Ghafouri, 2025).

3.2 Inclusivity and Linguistic Equity

One of the most consequential findings in recent literature is the role of GenAI in promoting linguistic equity across global higher education. Global academic publishing and university instruction are heavily dominated by English, creating systemic barriers for non-native English speakers, multilingual writers, and scholars from lower-resourced regions (Ugwuanyi et al., 2025). These scholars frequently face high rejection rates or severe peer-review critique due to surface-level syntactic errors, idiomatic awkwardness, or non-standard stylistic conventions, regardless of the underlying empirical rigor of their work (Karaarslan & Aydın, 2026).

GenAI functions as an effective linguistic equalizer by providing real-time translation, syntactic refinement, and contextual phrasing suggestions. By reducing language barriers, LLMs allow multilingual writers to express complex conceptual ideas in fluent academic English, democratizing participation in global scientific discourse and reducing the historical marginalization of non-native English researchers (Maxutov et al., 2026).

3.3 Formative Feedback and Assessment Optimization

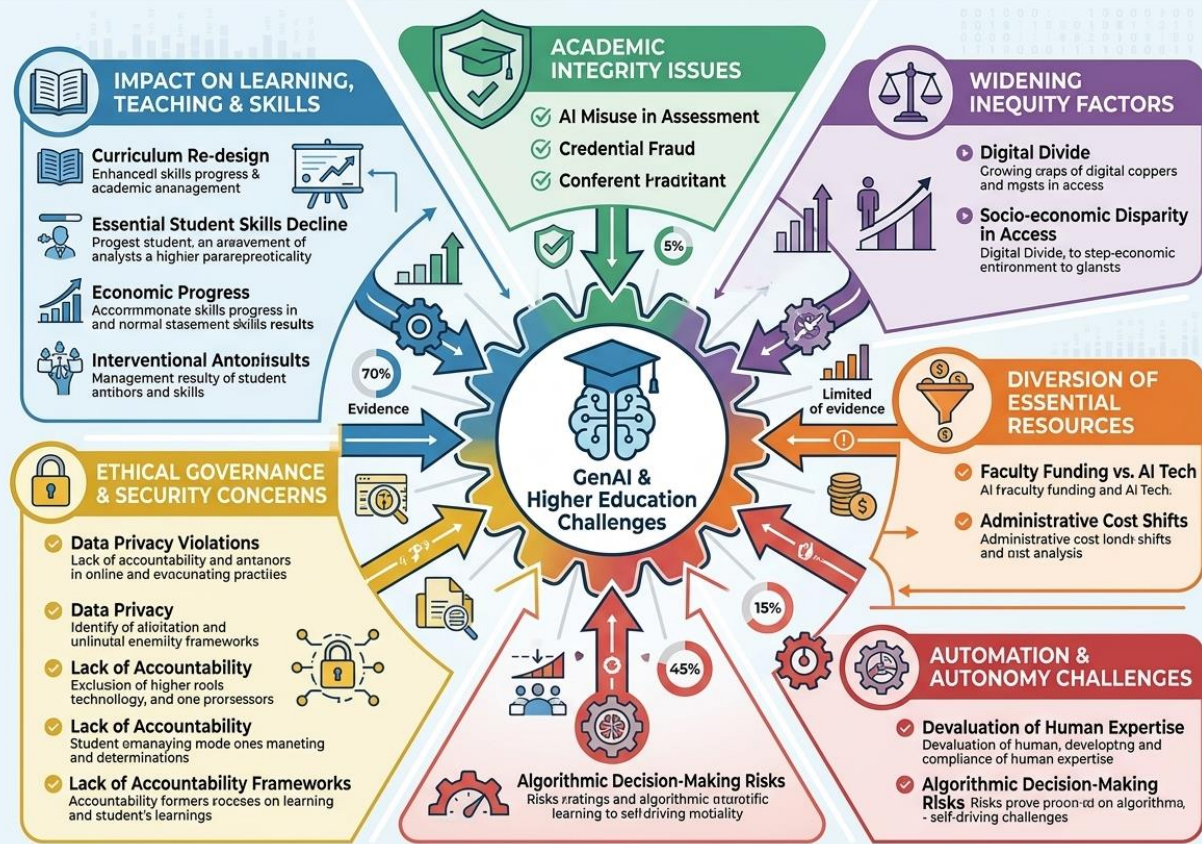
From an instructional standpoint, GenAI alters the dynamics of writing feedback and assessment. In traditional university settings, students often experience long feedback delays between essay submission and faculty evaluation, limiting the formative impact of instructor comments. GenAI platforms offer immediate, personalized feedback on draft submissions, identifying logical leaps, grammatical errors, and structural inconsistencies in real time (Moore & Lee, 2024).

This continuous feedback loop increases writing motivation, enhances self-efficacy, and fosters student self-regulation. For educators, integrating AI into preliminary evaluation workflows streamlines routine grading tasks, enabling faculty to focus their instructional energy on higher-order pedagogical mentoring, critical source evaluation, and deep conceptual engagement (Zhai, 2025).

4. Challenges: Integrity, Cognition, and Epistemic Risks

Despite these documented gains, the rapid proliferation of GenAI introduces severe challenges that threaten academic integrity, scholarly rigor, and the core cognitive objectives of higher education. These risks extend beyond traditional definitions of plagiarism, encompassing technical vulnerabilities, cognitive atrophy, and institutional inequalities (Bittle & El-Gayar, 2025).

INTEGRATIVE MODEL OF THE PRINCIPAL CHALLENGES PRESENTED BY GenAI IN HIGHER EDUCATION



Source: GenAI & Higher Education for asdopatic educatim and Higher Eleaning and Challenges, smart based on professional journal publication.

Figure 2. Integrative Model of Principal Challenges, Risks, and Institutional Factors Presented by Generative AI in Higher Education.

4.1 Fabricated Citations, Hallucinations, and Source Work Contamination

A major structural vulnerability of Large Language Models in academic contexts is their propensity to produce "hallucinations" statistically plausible but completely false factual assertions and bibliographical records. Because LLMs operate via probabilistic token prediction rather than database lookup, they frequently generate references with realistic-sounding author names, journal titles, publication years, and DOIs that do not exist in reality (Lai et al., 2026).

Empirical modeling demonstrates the systemic nature of this issue. Regression analyses modeling generated non-existent references confirm that source generation without rigorous human verification inevitably leads to scholarly contamination. When students or researchers uncritically incorporate these fabricated sources into academic papers, the foundational mechanism of academic discourse attributable, verifiable scientific evidence is severely compromised (Niimi, 2025).

4.2 Epistemic Drift and Cognitive Atrophy

Beyond immediate citation errors, the unchecked use of GenAI introduces the long-term risk of "epistemic drift". Epistemic drift describes a phenomenon wherein reliance on opaque, black-box algorithms detaches scientific inquiry and academic writing from authentic causal understanding and critical human reasoning. When students delegate the synthesized construction of an argument to an LLM, they bypass the essential

cognitive friction involved in reading primary texts, resolving conflicting claims, and formulating original conclusions (Aguite 2026).

Over time, this reliance can lead to cognitive atrophy: a gradual degradation of students' abilities to construct complex arguments independently, evaluate nuanced qualitative evidence, or maintain critical thinking skills. Furthermore, GenAI outputs tend toward homogenized, risk-averse prose styles, which can suppress creative voice, original metaphor, and non-standard intellectual perspectives (Revesai, 2025).

4.3 Unreliable AI Detection and the Attribution Dilemma

Institutions seeking to enforce academic integrity have frequently turned to automated AI-detection software. However, empirical evidence consistently highlights the fundamental unreliability of these detection tools for integrity judgments. AI detectors rely on metrics such as perplexity and burstiness, which are easily bypassed through basic prompt engineering, paraphrasing, or minor manual editing (Tsao, 2025). Crucially, these detection tools suffer from significant false-positive rates. Empirical studies show that AI detectors disproportionately flag writing produced by non-native English speakers. Because multilingual writers often employ structured, highly predictable grammatical patterns, automated tools frequently misidentify their authentic work as machine-generated text. This creates an environment of institutional distrust, exposes innocent students to false allegations of academic misconduct, and complicates clear administrative governance (Tsigaris & da Silva, 2026).

4.4 Algorithmic Biases and Global Disparities

GenAI models inherit and amplify the systemic demographic, cultural, and ideological biases embedded in their training data. Models trained predominantly on Western, English-medium digital texts often reproduce Eurocentric historical narratives, perpetuate gender or racial stereotypes, and display cultural insensitivity toward Indigenous or Global South knowledge systems (Wei et al., 2025).

Simultaneously, the integration of GenAI exacerbates global educational divides. Well-resourced institutions in high-income countries rapidly adopt premium, subscription-tier AI tools and high-speed digital infrastructure, whereas universities in low-income regions face severe financial constraints and restricted digital access. This economic inequality threatens to widen global disparities in academic publishing and higher education quality (Jamal Eddine et al., 2026).

5. Global Policy Frameworks and Institutional Governance

Addressing the paradox of GenAI in academic writing requires moving away from reactive bans toward systematic, human-centered governance models. International organizations, led by UNESCO, have developed foundational principles to guide institutions in balancing technological adoption with ethical oversight (Slimi, 2026).

5.1 UNESCO Guidelines and Human-Centered Principles

The global governance baseline rests upon landmark UNESCO frameworks, including the *Beijing Consensus on Artificial Intelligence and Education* (2019), the *Recommendation on the Ethics of Artificial Intelligence* (2021), and the *Guidance for Generative AI in Education and Research* (2023/2025). These documents argue that AI integration must explicitly serve Sustainable Development Goal 4 (SDG 4: Quality Education) by preserving human agency, protecting educational equity, and securing user data privacy (Yılmaz, 2026).

The UNESCO human-centered framework rests on four essential pillars:

- **Protection of Human Agency:** Core cognitive functions, critical reasoning, and final scholarly ownership must remain centered on human learners and researchers.

- **Institutional and Pedagogical Validation:** GenAI tools must undergo rigorous pedagogical, technical, and ethical validation prior to classroom integration (Sabbaghan & Eaton, 2025).
- **Data Privacy and Sovereignty:** Mandating strict regulatory protections against unauthorized commercial mining of student data and institutional intellectual property.
- **Inclusive and Age-Appropriate Access:** Ensuring equitable access across diverse socio-economic groups while establishing developmental safeguards for independent AI interactions (Long & Quek, 2002). UNESCO policy guidelines mandate that GenAI should never usurp the role of the human educator or the authentic voice of the scholar. Policies must enforce transparent data management, preventing commercial AI vendors from harvesting student-generated intellectual property, while setting clear institutional boundaries regarding disclosure and attribution in academic submissions (Alduais et al., 2025).

5.2 Assessment Redesign: The AI Assessment Scale and Traffic Light Models

To translate high-level policy into classroom practice, higher education institutions are replacing traditional essays with AI-resilient, process-oriented assessment frameworks. Notable among these is the Artificial Intelligence Assessment Scale (AIAS) and the associated Traffic Light Model for educational assessment (Cote & Allahar, 2011).

The Traffic Light Model establishes three distinct operational zones for academic writing assignments:

- **Red Zone (No AI Permitted):** Designates assignments requiring human-only cognitive synthesis, raw recall, or closed-book reflections to evaluate baseline conceptual mastery.
- **Amber Zone (Scaffolded Collaboration):** Permits AI assistance for specific pre-writing or post-writing tasks, such as brainstorming, outlining, or grammar editing, while requiring students to submit prompt logs and track changes (Daškevič & Burinskienė, 2025).
- **Green Zone (Full GenAI Integration):** Positions GenAI as an active co-creator or object of critical analysis, where students are assessed on their ability to prompt, critique, fact-check, and refine machine-generated outputs (Zeivots 2025).

By categorizing assignments into explicit operational zones, institutions eliminate policy ambiguity, reduce student anxiety, and ensure that assessments measure genuine subject mastery rather than unauthorized algorithmic output (Fowler, 2023).

5.3 Developing Critical AI Literacy

Successful governance depends on building critical AI literacy among both faculty and students. Critical AI literacy goes beyond technical operational skills; it encompasses an understanding of how language models function, their probabilistic limitations, training biases, data privacy implications, and theoretical risks such as epistemic drift (Daher, 2025). Institutional investments must prioritize professional development programs that equip academic staff to redesign curricula, formulate contextual writing policies, and guide students toward ethical, scaffolded tool usage (Oleksiyenko, 2017).

6. Synthesis of Empirical Literature and Research Mapping

To provide an up-to-date empirical overview, recent scoping and systematic reviews published between 2024 and 2026 were mapped and synthesized. The systematic reviews reveal clear methodological trends, geographic concentrations, and persistent empirical gaps (Kaldas, 2025).

Table 1: Methodological Mapping of Key Syntheses on GenAI in Academic Writing

Review Synthesis	Temporal & Sample Scope	Primary Focus	Key Findings & Synthesis Outcomes
Scoping Review on GenAI in Higher Ed [cite: 1, 5]	2024–Q2 2025 ($n = 25$ empirical studies)	PRISMA-ScR mapping of GenAI across academic writing stages	Establishes that practice operates ahead of proof. GenAI serves primarily as assistive scaffolding for planning, organization, and fluency. Identifies significant risks in hallucinated citations, overreliance, and unreliable AI detectors. Evidence skews heavily toward well-resourced, English-medium institutions.
Systematic Review on EFL / Higher Education [cite: 3, 8]	2023–2024 ($n = 30$ research articles)	PRISMA systematic review of roles, benefits, and ethics in language teaching	Identifies major gains in cohesion, precision, clarity, and learner engagement. Highlights severe risks of plagiarism, diminished student creativity, ethical misconduct, and structural limitations in processing nuanced context.
Qualitative Content Synthesis on ChatGPT [cite: 2]	Nov 2022–Mar 2024 ($n = 40$ publications)	Content analysis of ChatGPT’s impact on scholarly communication	Frames GenAI as a systemic force reshaping scholarly communication across three dimensions: productivity (drafting/editing), inclusivity (democratizing language for non-native writers), and academic integrity (authorship challenges).
Systematic Literature Review on AI-Writing [cite: 7]	Up to 2026 (Empirical SLR)	Synthesis of technical, social, and environmental AI dimensions	Focuses on writing support, feedback mechanisms, assessment redesign, human agency, trust, student autonomy, and evolving institutional governance models.

The current body of evidence displays distinct concentrations and structural gaps across the writing continuum, as detailed in Table 2 below.

Table 2: Matrix of GenAI Opportunities and Risks Across the Academic Writing Continuum

Writing Stage	Assistive GenAI Applications	Primary Pedagogical Opportunities	Associated Risks & Mitigation Imperatives
1. Pre-Writing & Planning	Prompt-driven brainstorming, outline generation, research question decomposition.	Reduces cognitive load, helps overcome starting inertia, structures initial ideas.	Risk: Premature narrowing of thesis topics and algorithmic bias. Mitigation: Mandatory human ideation logs.
2. Source Discovery & Review	Synthesizing dense articles, summarizing key findings.	Accelerates initial literature mapping and cross-disciplinary scanning.	Risk: Hallucinated non-existent references and superficial reading.

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			Mitigation: Direct primary source verification.
3. Drafting & Composition	Paraphrasing, expanding sentence structures, transitional smoothing.	Enhances sentence cohesion, vocabulary precision, and structural flow.	Risk: Cognitive offloading, epistemic drift, loss of personal style. Mitigation: Restricted usage zones via Traffic Light Models.
4. Revision & Editing	Grammar checking, academic tone alignment, language translation.	Democratizes academic publishing for non-native English scholars.	Risk: Over-smoothing leading to generic academic prose and detector false positives. Mitigation: Explicit disclosure policies.

Global policy frameworks offer strategic alignment mechanisms to translate macro-level ethical principles into micro-level institutional practices, as detailed in Table 3.

Table 3: Operationalizing UNESCO Policy Frameworks within Higher Education Institutions

Governance Pillar	Core UNESCO Imperative	Institutional Implementation Mechanism	Strategic Target Outcome
Pedagogical Alignment	Protect human agency and preserve authentic critical reasoning.	Implement process-oriented assessments and the Traffic Light Model.	Prevents cognitive atrophy and deters substitutive algorithmic usage.
Ethical Validation	Ensure tools are pedagogically validated prior to classroom deployment.	Establish institutional AI vetting committees and secure enterprise sandbox environments.	Mitigates commercial data exploitation and ensures equitable access.
Data Governance	Protect student data privacy and mandate intellectual property sovereignty.	Enforce strict institutional data privacy contracts with EdTech providers.	Secures user data privacy and prevents unconsented model training.
Inclusion & Equity	Bridge regional digital divides and prevent socio-economic exclusion.	Provide subsidized enterprise access to premium AI models across low-resource cohorts.	Prevents widening achievement gaps between well-resourced and marginalized students.

7. Future Directions and Empirical Gaps

While the literature published between 2023 and 2026 offers valuable insights into undergraduate writing dynamics, several structural gaps remain within the current body of research. Addressable priorities for future empirical investigation include (Tang et al., 2026):

- **Geographic and Contextual Diversity:** The current evidence base skews heavily toward well-resourced, English-medium institutions in North America, Europe, and high-income Asian territories. There is an urgent need for empirical investigations centered on Global South higher education institutions, where resource constraints, bandwidth limitations, and distinct socio-linguistic dynamics require tailored governance models (Liyanage & Walker, 2019).
- **Cohort Expansion:** Existing empirical studies focus predominantly on undergraduate student populations. Empirical research on postgraduate researchers, doctoral candidates, and faculty cohorts remains sparse. Given that doctoral dissertations and academic grant proposals represent advanced scientific production, investigating how GenAI affects thesis development and scientific authorship at these higher levels is essential (ostwick & Weinberg, 2022).
- **Longitudinal Methodologies:** Much of the published literature relies on cross-sectional surveys, self-reported user satisfaction, or short-term proxy metrics (such as immediate grade changes on a single assignment). Longitudinal research designs are required to evaluate the long-term impact of sustained GenAI usage on students' cognitive development, critical writing capabilities, and professional scholarly identities over multi-year academic trajectories (Ocean et al., 2019).

Conclusion

The integration of Generative Artificial Intelligence into academic writing within higher education represents a paradigmatic shift that transcends simple technological adoption, fundamentally reconfiguring the cognitive, pedagogical, and ethical dimensions of scholarly communication. This review has demonstrated that GenAI functions as a dual-edged instrument: when deployed within scaffolded, assistive frameworks, it enhances writing efficiency, democratizes linguistic participation, and provides immediate formative feedback; when employed substitutively, it precipitates epistemic drift, cognitive atrophy, and systemic risks to scholarly integrity through hallucinated citations and algorithmic bias. The evidence synthesized across empirical studies, systematic reviews, and global policy frameworks reveals a critical institutional paradox: writing practices among students and faculty are evolving substantially faster than evidence-based pedagogical guidance or administrative governance mechanisms. Higher education institutions face the imperative to move beyond reactive prohibition toward deliberate, human-centered integration models. UNESCO's foundational principles protecting human agency, ensuring pedagogical validation, securing data privacy, and promoting inclusive access provide essential ethical scaffolding for institutional policymaking. The Traffic Light Model and Artificial Intelligence Assessment Scale offer pragmatic frameworks for translating high-level principles into classroom practice, enabling differentiated assignment design that preserves authentic assessment of cognitive mastery while permitting scaffolded AI collaboration. However, successful implementation demands comprehensive investment in critical AI literacy for both faculty and students, encompassing technical operational knowledge alongside understanding of algorithmic limitations, training biases, and epistemological risks. Structural gaps in the current evidence base necessitate urgent empirical attention. Geographic concentration in well-resourced, English-medium institutions limits the generalizability of findings to Global South contexts where resource constraints and distinct socio-linguistic dynamics demand tailored governance approaches. Predominant focus on undergraduate populations neglects postgraduate researchers and faculty cohorts whose advanced scientific production requires nuanced investigation. Furthermore, the field's reliance on cross-sectional methodologies leaves critical questions regarding long-term cognitive development and professional scholarly identity formation under sustained GenAI usage largely unanswered. Ultimately, the emerging evidence points decisively toward an assistive rather than substitutive paradigm: GenAI achieves its greatest pedagogical value when positioned as a cognitive and metacognitive scaffold that complements human judgment, critical interrogation, and argumentative synthesis. The technology's capacity to support rather

than supplant scholarly reasoning depends fundamentally on deliberate pedagogical design, transparent governance, and sustained commitment to educational equity. As higher education navigates this transformative moment, the central challenge remains preserving authentic human intellectual development while leveraging technological capabilities to enhance inclusive participation in global academic discourse.

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