Navigating the Dual Challenge: A Strategic Framework for Ethical and Pedagogical Integration of Generative AI in Higher Education

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Abstract. The exponentially rapid ascent of Generative Artificial Intelligence (GenAI) and merging into multiple levels and niches of the higher education ecosystem has created a demand for approaches capable of tending to an ever-growing number of teaching staff who feel as if they are falling behind and incapable of keeping up and catching up with all that is being done regarding GenAI. This paper proposes a Strategic Framework for the ethical integration of Generative AI, developed through an exploratory initiative at the Viseu School of Education (ESEV), which has tackled these challenges and has worked towards the iterative and participative design of a strategic and scalable framework for the critical and its responsible integration of GenAI into faculty teaching practice. The work details the methodological architecture and operational indicators of this framework to ensure its scalability across higher education contexts. The multi-phase methodology adopted employs a robust mixed-methods approach, which includes a comprehensive assessment to diagnose faculty AI literacy, adoption patterns, and ethical practice and risk perceptions. Data collected informs the subsequent systematic inventory of high-utility tools and the establishment of a dedicated, interdisciplinary Study Group for continuous knowledge of co-creation. The project also includes the design and deployment of subject-specific, practical workshops focused on developing both the technical proficiency and critical pedagogical competencies required for effective integration of GenAI in teaching activi-

ties. It culminates in the delivery of evidence-based pedagogical recommendations and a comprehensive Faculty Manual for Ethical AI Integration. This project is not merely a context-specific case study but rather provides a transferable and potentially replicable framework for higher education institutions, aiming to enhance the quality of teaching and proactively cultivate an ethically grounded culture of innovation in the age of AI.

Keywords: Generative Artificial Intelligence, Higher Education, Pedagogical Innovation, Lecturer Training, AI Literacy.

1 Introduction

The rapid rise of Generative Artificial Intelligence (GenAI) is reshaping higher education, from assessment practices and curriculum design to faculty development, while creating asymmetric conditions in institutional readiness, access, and capacity [1] [2]. On the one hand, student adoption is accelerating; on the other, institutional responses and staff preparation remain uneven, deepening concerns about emerging "AI divides" in digital literacy and pedagogical innovation [3] [4] [5]. These tensions foreground a dual challenge: expanding pedagogical innovation, personalized learning, immediate feedback, and support for administrative and teaching tasks without compromising academic integrity and core educational values such as authorship, critical thinking, and fairness [1] [2] [3].

While the potential of GenAI to transform learning is widely acknowledged, recent literature highlights a critical gap in practical, scalable frameworks for faculty development that move beyond tool-focused training [6] [7]. Many initiatives remain confined to introductory workshops or ad hoc guidance, which help educators understand what GenAI can do, but provide little support for deciding what it should do within specific disciplinary and institutional contexts. As a result, lecturers frequently report a sense of being simultaneously pressured to adopt GenAI and underprepared to integrate it in ways that are pedagogically meaningful and ethically defensible [3] [4]. This gap between expectation and support reinforces uneven practices and may inadvertently widen internal disparities in AI literacy and confidence among staff.

At the same time, higher education institutions face growing external pressure to demonstrate that their responses to GenAI are aligned with broader regulatory and ethical frameworks. International guidance stresses the need to develop AI competencies among teachers, not only in technical terms but also in relation to ethics, governance, and human-centred design [6] [7]. The European policy landscape similarly emphasizes AI literacy as a strategic capability that must be cultivated across sectors, including education [8]. For institutions, this means that GenAI cannot be treated as a temporary disruption, but as a catalyst that requires rethinking professional development, assessment, and curriculum design in integrated ways.

It is against this background that the present study situates itself. The paper reports on an exploratory initiative implemented at the School of Education (ESEV) of the Polytechnic Institute of Viseu (IPV), which seeks to address the scarcity of evidence-based models for institutional capacity building in the age of AI. Rather than focusing

solely on compliance or on the demonstration of isolated use cases, the project aims to support lecturers in developing coherent, context-sensitive approaches to GenAI that are grounded in their own teaching realities. The core assumption is that sustainable innovation emerges when educators are positioned not merely as end-users of tools, but as co-designers of AI-enhanced learning environments.

To this end, the project adopts a Design-Based Research (DBR) approach that combines iterative design, implementation, and reflection with close collaboration between researchers and practitioners.

The goal is to co-create a support ecosystem that aligns pedagogical innovation with ethical stewardship, offering a replicable blueprint for integrating GenAI into teaching practices in ways that are both critically grounded and operationally feasible [7] [8]. Following this introduction, Section 2 synthesizes recent literature on GenAI in higher education from faculty and governance perspectives; Section 3 details the DBR methodology and its implementation phases; Section 4 discusses findings and expected outcomes; and Section 5 presents conclusions, limitations, and directions for future work.

2 Literature Review

2.1 Generative AI in Higher Education: Studies and Projects from Faculty Perspectives

Generative Artificial Intelligence (GenAI) systems use algorithms to analyze large datasets and generate original content in text, images, and audio formats [9]. This technology presents universities with both opportunities and challenges, prompting discussion among educators about its potential to transform teaching methods [10].

Research examining faculty perspectives reveals a complex landscape where educators recognize GenAI's transformative potential while grappling with significant implementation challenges [11]. Faculty members use these tools as virtual assistants that provide real-time personalized support and help develop educational resources tailored to student needs [11]. GenAI can enhance teaching through personalized learning and innovative pedagogy [12] [13], while improving accessibility through multimodal content [14].

However, academic integrity emerges as the most pressing concern. Faculty express significant worries about detecting and preventing academic dishonesty, particularly difficulties in identifying AI-generated plagiarism [2] [15] [16]. Beyond academic misconduct, educators identify broader ethical challenges including data privacy, security issues, potential bias from training datasets, and questions about whose expertise influences AI development [16] [17] [18].

Student over-reliance on AI tools represents another major concern, with faculty worried about impacts on soft skills and critical thinking capabilities [16] [19]. Semi-structured interviews reveal tensions between instructor and student preferences for AI engagement [20] [21] [22].

A critical systemic challenge is insufficient AI literacy and inadequate institutional resources among faculty, which significantly hinder effective adoption [23]. Successful

implementation requires comprehensive institutional transformation beyond mere technology adoption, including revisions to governance, assessment, and institutional values [24]. The APRU document [14] recommends comprehensive training programs combining technical skills with interdisciplinary discussions, along with institutional partnerships for sharing best practices. Faculty require ongoing professional development to understand GenAI's capabilities and limitations, especially regarding academic integrity [5] [25].

Institutional responses vary widely: some universities ban AI tools while others integrate them into active learning approaches [26]. Evidence suggests that equity-focused implementation can boost student motivation and enhance feedback quality, provided institutions balance innovation with accountability and preserve core academic principles [27] [28].

2.2 Building Technical and Pedagogical Competencies for AI-Enhanced Teaching

The successful pedagogical incorporation of GenAI hinges on faculty cultivating comprehensive digital competencies that encompass both technical knowledge of generative systems and awareness of associated ethical and regulatory boundaries. While many educators acknowledge the potential of GenAI to enhance classroom experiences and provide immediate responses, they also recognize gaps in their understanding of operational mechanics and optimal integration strategies that safeguard ethical standards and foster student originality [25] [27].

UNESCO [6] further emphasizes the potential of technology to catalyze collaborative creation between instructors and students, thereby fostering innovation and supporting learner autonomy. With appropriate preparation, educators can reimagine GenAI beyond simple content production, transforming it into an educational instrument that cultivates analytical reasoning, scholarly inquiry, and independent intellectual development.

The phenomenon of AI hallucinations, responses that appear plausible yet contain factual inaccuracies, underscores the importance of strengthening digital literacy among both instructors and learners when evaluating the credibility of machine-generated outputs [9] [28]. Such technical pedagogical expertise becomes crucial for educators to facilitate critical and accountable use of these resources, preventing uncritical reliance on automated content generation.

Recent evidence from faculty interviews reinforces that competence building must be treated as an institutional priority, not an individual burden. Management educators report feeling underprepared to guide students' responsible use of tools such as ChatGPT, citing steep learning curves, limited training opportunities, and uncertainty about how to integrate AI without compromising academic integrity or the mentor-student relationship [29].

These concerns extend to data privacy and compliance, where faculty call for more explicit institutional guidance on safe practices for student information and course materials, particularly in light of European data protection expectations [29].

Policy analyses also suggest that training should be designed as a structured, ongoing programme that develops both staff and students. Across a global sample of university policies and guidelines, standard measures include formal guidance on the ethical use of AI, authentic assessment design to reduce misuse, and capacity-building initiatives such as workshops, online modules, and dedicated support resources to foster AI literacy [30].

At the same time, gaps persist, especially around data privacy provisions and equitable access to tools, suggesting that faculty competencies must include practical knowledge of risk mitigation, disclosure norms, and inclusion-oriented teaching strategies [30].

From an organisational perspective, competence building is most effective when supported by units that can translate strategy into practice. Analyses of strategic communication at leading universities indicate that teaching and learning offices and development centres often serve as bridges between institutional direction and grassroots innovation, absorbing top-down priorities while enabling bottom-up experimentation and professional learning [31].

This suggests that faculty development can be strengthened through communities of practice, internal advisory groups, and accessible support structures that keep guidance current amid rapid tool evolution.

Finally, professional development efforts should anticipate uneven adoption across staff cohorts. Institutional guideline discourse highlights generational divides in digital literacy, where some faculty may require targeted support to adopt these tools confidently and ethically, reducing the risk that unequal readiness widens internal capability gaps [32].

2.3 Governance, Ethics, and Regulatory Frameworks for Responsible AI Integration

The integration of GenAI into higher education necessitates robust governance structures that strike a balance between innovation and ethical and regulatory responsibility. Recent comparative analyses have shown that universities across regions adopt varied approaches, often lacking coherent institutional frameworks to manage the adoption and risks of GenAI. [33] analyzed AI policies across 343 universities in five countries, revealing that more than half of the universities delegate AI use decisions to instructors, while fewer than one-fifth enforce strict prohibitions. Only 31% explicitly link AI policies to academic integrity, and almost half provide no clear guidance to staff or students. This fragmented landscape highlights the global lack of standardized governance models and underscores the need for adaptive institutional policies that are grounded in transparency, accountability, and inclusivity.

Similarly, [34] examined Swedish higher education institutions and found that only a minority had formal guidelines for GenAI. Most institutions offered limited web-based information rather than structured governance documentation. The study highlighted five critical policy dimensions: good academic practice, GenAI use and governance in education, information governance, ethical and social impact, and GenAI essentials. Swedish institutions emphasize transparency and responsibility; however, the

lack of national coordination creates inconsistencies in ethical standards and access to equity. The authors argue that universities must institutionalize AI literacy, integrate ethical training, and develop national directives that harmonize policy development across sectors.

Ethical governance of GenAI also hinges on managing risks related to data protection, algorithmic bias, and human oversight. [35] identified data privacy and algorithmic fairness as leading challenges in higher education. They emphasized compliance with the General Data Protection Regulation (GDPR) and the use of advanced encryption to protect student information. Their findings advocate institutional audits on algorithmic bias, ensuring diverse datasets and transparent decision-making to prevent discrimination. Furthermore, the authors propose clear institutional policies defining acceptable AI use to preserve academic integrity and authenticity in student work.

At a broader level, governance frameworks should connect institutional policy to social responsibility and sustainable innovation. [1] observed that effective GenAI governance depends on embedding pedagogical theory, such as Laurillard's Conversational Framework and the SAMR model, into policy design. These models foster reflective and interactive learning while ensuring the ethical and inclusive use of technology. Embedding ethical awareness in governance allows higher education institutions to navigate tensions between innovation, integrity, and equity.

In parallel, [36] described a tri-phased approach to integrating GenAI in higher education that combines literature review, stakeholder consultation, and qualitative data analysis. Their research demonstrates that a transparent and participatory governance process enhances policy acceptance among faculty and mitigates ethical concerns related to plagiarism and loss of interpersonal skills. Governance structures should therefore promote stakeholder participation, including faculty, students, and administrative units, to ensure policies remain contextually relevant and ethically grounded.

Overall, the literature converges on three governance imperatives: (1) formal institutional policies aligned with global and regional regulatory frameworks such as the GDPR and the forthcoming EU AI Act, (2) explicit ethical standards addressing fairness, privacy, and integrity, and (3) capacity-building mechanisms that enhance faculty AI literacy and ethical reasoning. Effective governance of GenAI in higher education must thus move beyond reactive regulation toward a proactive culture of ethical innovation, ensuring that AI serves as a pedagogical ally while upholding the principles of transparency, responsibility, and human agency.

3 Methodology

This project adopts a Design-Based Research (DBR) methodology for tackling both the goal of solving a pragmatic educational problem, the lack of structured integration of Generative AI (GenAI) in teacher training, and the generation of theoretical insights into how these technologies influence pedagogical innovation. These may be considered the challenges established at the beginning of the project, and that will culminate in multiple outcomes that may go far beyond the provision of guidelines and training

activities suitable for teachers. DBR is also considered inherently iterative and interventionist, so it is considered ideal for the complex environment of higher education teaching and learning activities, where technological, professional, and institutional variables are continuously combined and rethought.

The iterative nature of this process demands solutions like the ones provided by employing the Framework for Innovation Design (the Double Diamond) [37], which segments the research into four distinct phases: Discover, Define, Develop, and Deliver, begins with a challenge, ends with an outcome and may have more than one iterative moment during the 4 phases before mentioned. This methodological workflow ensures that the technical requirements of GenAI systems, such as API constraints, data privacy protocols, and prompt engineering architectures, are systematically integrated into the pedagogical design.

This 4-phase structure is believed to ensure a rigorous progression between macro activities, such as mapping teachers need to establish sustainable communities of practice and utilizing a mixed-methods approach for data collection. The macro activities throughout the project are illustrated in Fig. 1.

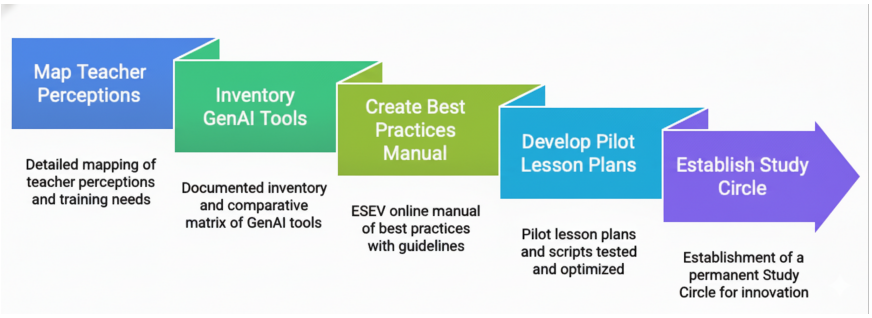

Fig. 1. Macro activities thought-out for the project.

In the first stage, known as the Discover stage, the project team will focus on understanding the context and completing the "Map of Teacher Perceptions." This mapping initiative will outline what teachers already know and what they need to learn about AI. To do these quantitative surveys, they will be applied online and distributed among the entire teaching staff at ESEV, who will hopefully check and share their perspective regarding their own current skills and AI literacy. At the same time, semi-structured interviews with a smaller group of teachers from different scientific fields will be conducted. These interviews are important to understand the participants' personal feelings, fears, and ideas about using AI in their teaching activities and higher education in general. This stage will also help them to become self-aware of the gaps in their own professional training.

In the Define stage, the information collected in the first stage will be used to make decisions. One of its goals is to create an "Inventory of GenAI Tools", according to their perceived educational values. To do this, the project includes a comparative analysis of a list of different AI applications. A focus group with teaching staff will discuss the results of this comparative analysis and help choose a set of tools considered useful

for the project training activities. The resulting comparative matrix and the remaining inherent activities will help define the guidelines to be further defined in the project.

The third stage is Develop, and it is probably the most creative part of the project. The "ESEV Online Manual" and the "Pilot Lesson Plans" will both be produced at this stage. The outcomes of this stage are intended to be used as materials that may help teachers use AI in critical and innovative ways when compared to their current practices. The manual will be reviewed and commented on by a group of specialists selected according to their work already conducted in the field. The lesson plans will test them in a real class environment, and during these tests, the activities will be directly observed in the classes to determine what works and what does not work according to the lesson plan's expected results. This feedback will aid the revision and improvement of the materials designed before their final implementation.

The four stages end with the Deliver moment that focuses on the result and the "Establishment of the Study Circle." The project's impact will be measured with the use of an online questionnaire that will touch base in three areas: student learning, teacher skills, and institutional strategy, as illustrated in Fig. 2.

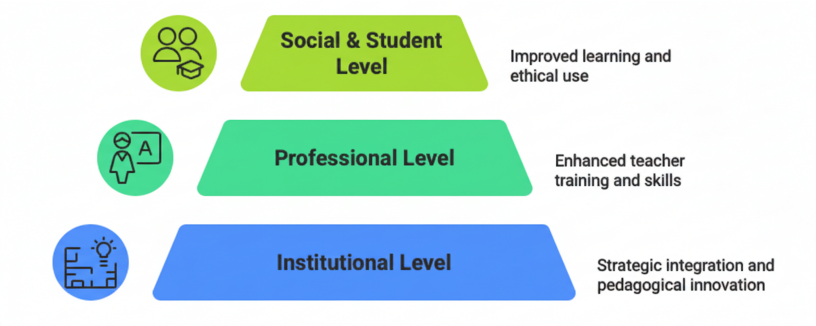

Fig. 2. Three main areas of the project.

Each of these levels will be evaluated according to specific indicators and Performance Indicators exemplified in table 1.

Table 1. Examples of evaluation indicators.

Level	Dimensions	Key Performance Indicators (KPIs)
Institutional	Strategic Alignment	Number of departmental guidelines updated; Frequency of AI-related mentions in Quality Assurance reports.
Professional	AI Literacy	Change in pre- and post-training technical proficiency scores; Number of AI-integrated lesson plans peer-reviewed.
Social & Student	Pedagogical Impact	Percentage of students reporting critical thinking when engaging with AI outputs; Reduction in academic integrity incidents related to AI misuse.

To do so, teachers will be tested before and after the training, through an online questionnaire, as to their AI literacy, opinion about their teaching and learning activities and institutional strategy, and the team will try to assess the project's impact in these fields. Teachers will also be asked to share some personal input throughout their journey in a form with open questions about their endeavors. All the data collected and analyzed is expected to contribute to solving the challenge and delivering the outcome aimed for. It is hoped that, in the end, the project may help create at ESEV a culture and concern with the improvement and innovation in terms of AI literacy in the teaching staff and how it propagates to teaching and learning activities and the institution's overall strategy in relation to AI.

4 Expected Results and Impact

The project is expected to generate a coherent set of results that operate at the levels of classroom practice, professional culture, and institutional strategy within ESEV. At a practical level, the initiative aims to consolidate resources that make the integration of GenAI into teaching activities more intentional, transparent, and sustainable. Rather than leaving each lecturer to navigate GenAI independently, the project will provide shared reference points that reduce fragmentation and support more consistent decision-making across programmes and disciplines.

One key expected result is a clearer articulation of how GenAI can be aligned with existing curricular goals and assessment practices. By working with lecturers from different subject areas, the project intends to identify patterns of use that genuinely add pedagogical value, as opposed to simply replicating existing tasks with new tools. This is anticipated to result in a portfolio of example activities and assessment strategies that demonstrate how GenAI can support inquiry, formative feedback, and discipline-specific skills, while still preserving space for student authorship and critical thinking. The emphasis is not only on what tools are available, but on what kinds of learning they enable or constrain in concrete classroom situations.

A second cluster of expected results concerns the professional development of lecturers. Through their involvement in iterative cycles of design, trial, and reflection, teachers are expected to move from isolated experimentation or avoidance towards a more confident and principled engagement with GenAI. This should be visible in several ways: in the language they use to discuss GenAI with colleagues and students; in the explicitness with which they frame expectations around its use; and in their ability to justify, adapt, or suspend GenAI-based activities in response to pedagogical or ethical concerns. The project thus aims to foster a shift from viewing GenAI primarily as a technical challenge to understanding it as a matter of pedagogical design and professional judgement.

At the institutional level, the project is expected to contribute to a more strategic and anticipatory stance towards GenAI. Drawing on the evidence gathered throughout the

different phases, the team will be able to outline principles and processes that can inform future policy discussions, accreditation processes, and quality assurance mechanisms. This may include, for example, procedures for periodically updating guidance as tools evolve, or for involving students and external stakeholders in conversations about acceptable AI use. In this sense, the project's results are expected to outlive the specific tools currently in use, providing a framework that remains relevant even as platforms become obsolete.

For students, the anticipated impact is to encounter learning environments where GenAI is neither uncritically celebrated nor simply banned, but integrated in ways that are explicit, purposeful, and open to discussion. As lecturers gain confidence and clarity, students should benefit from tasks that require them to engage with GenAI critically, questioning outputs, comparing perspectives, and reflecting on their own role in the knowledge-production process. Over time, this is expected to support the development of more robust digital and AI literacies, better preparing students for contexts beyond higher education where such competencies will be increasingly necessary.

Taken together, these results and impacts aim to demonstrate that it is possible to integrate GenAI into higher education in a way that supports innovation without eroding the core values of academic work. The project seeks not only to respond to current pressures but to lay the groundwork for a more reflective, participatory, and ethically grounded approach to future technological change.

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5 Conclusions/Final considerations and Future Work

The integration of Generative Artificial Intelligence into higher education is neither a purely technological nor a purely pedagogical undertaking; it is a multidimensional process that demands ethical vigilance, institutional coherence, and sustained professional development. This study demonstrates that successful adoption should hinge itself on a strategic approach that prioritizes human agency over technological determinism. Future results, namely the proposal of a strategic framework capable of translating comprehensible ethical guidelines into actionable pedagogical indicators, are expected to contribute to current practices not only within ESEV, but also in partner higher education institutions still finding their way through all the noise and hype gravitating around GenAI related issues and practices. By providing a structured progression, from diagnostic mapping to the establishment of Study Circles, ongoing work will offer the basis for replicable practices regarding institutional AI readiness. By embedding GenAI within a framework of critical reflection and collaborative learning, the initiative at ESEV-IPV illustrates how institutions can transform disruption into opportunity.

In this context, the integration of GenAI in higher education combines high pedagogical potential [12] [13] with ethical and assessment challenges that raise questions

about the role of the teacher [14] [38]. This project addresses these challenges through a proactive and structured approach, recognizing that technology alone does not ensure innovation. Successful integration depends on continuous teacher training, institutional regulatory adaptation, and a culture of integrity and critical thinking [14]. The project aligns with international initiatives promoting AI literacy and ethical GenAI use in teaching [39] [40] [41] [42]. By combining diagnosis, training, and applied research, the project provides a contextualized and transferable model, aligned with the EU Artificial Intelligence Act [8] and supporting more equitable digital transformation [6] [14].

Several key insights emerge from this work. First, faculty development is indispensable. Educators must acquire not only operational proficiency but also the capacity to interrogate the epistemological and ethical implications of GenAI. Without this dual competence, the risk of superficial adoption and compromised academic integrity remains high. Second, institutional alignment is critical. Fragmented policies and inconsistent practices undermine trust and exacerbate disparities in digital readiness. Clear guidelines, informed by international standards and adapted to local contexts, are essential to ensure coherence and accountability. Third, ethical considerations must permeate every stage of integration. Issues such as data privacy, algorithmic bias, and intellectual authorship are not peripheral concerns; they are central to safeguarding the values upon which higher education rests.

The project's outcomes, such as diagnostic assessments, curated tool inventories, interdisciplinary study circles, and evidence-based manuals, constitute a robust foundation for institutional transformation. Yet, these achievements should be understood as provisional rather than definitive. The rapid evolution of GenAI technologies and regulatory frameworks necessitates continuous adaptation. Moreover, the sustainability of such initiatives depends on resource allocation, leadership commitment, and the cultivation of a culture that values innovation without sacrificing integrity.

In sum, this project affirms that the integration of GenAI can enrich teaching and learning when guided by principles of responsibility, inclusivity, and critical engagement. It offers a replicable model for institutions seeking to navigate the dual challenge of technological advancement and ethical stewardship, contributing to the broader discourse on the future of higher education in the age of artificial intelligence.

Yet, despite these contributions, important questions remain open, pointing toward avenues for further inquiry.

Future research should extend beyond the institutional boundaries of this study to explore comparative and collaborative approaches. Establishing inter-university networks and communities of practice can accelerate knowledge exchange and harmonize standards across diverse educational contexts. Longitudinal studies are necessary to assess the impact of GenAI integration on student learning outcomes, faculty workload, and institutional reputation, providing empirical evidence to inform policy and practice.

Another priority is the development of adaptive assessment models that incorporate GenAI without compromising academic integrity. This includes designing evaluation frameworks that recognize the legitimate use of AI tools while preserving originality and critical thinking. Additionally, future initiatives should investigate the intersection

of GenAI with equity and inclusion, ensuring that technological innovation does not exacerbate existing disparities in access and opportunity.

Emerging technologies—such as multimodal AI systems and personalized learning platforms—will further complicate the ethical and pedagogical landscape. Anticipating these developments requires proactive scenario planning and continuous professional development. Ultimately, future work must embrace flexibility, interdisciplinarity, and evidence-based adaptation, positioning higher education as a leader in shaping an ethically grounded digital future.

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