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Article

AI Governance in Higher Education: A Lifecycle Assurance Model

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Abstract

Generative artificial intelligence (GenAI) is reshaping higher education across teaching, research, and administration; however, institutional governance has not kept pace with its rapid adoption. Prior scholarship emphasizes principles such as transparency, fairness, and accountability, but provides limited guidance for how institutions can operationalize these commitments in practice. This study addresses this gap by examining how higher education institutions can implement effective, sustained governance of AI systems. Drawing on a systematic and integrative review of AI governance literature and institutional theory, the article develops an assurance-based lifecycle framework that conceptualizes governance as a continuous organizational capability. The framework spans five stages: design and development, pre-deployment validation, institutional deployment, continuous monitoring, and adaptation. Within each stage, microethical practices are embedded as actionable checkpoints to translate ethical principles into operational processes. The framework defines the characteristics of higher education, including distributed governance, academic freedom, and multi-stakeholder decision-making, while addressing challenges associated with probabilistic systems and algorithmic drift. The study contributes a structured model with defined indicators, roles, and sociotechnical conditions that support effective implementation. These contributions provide practical guidance for institutional leaders seeking to align AI adoption with educational mission, equity, and student success.

Keywords: artificial intelligence, higher education, AI governance, lifecycle assurance, microethics

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1. Introduction

Artificial intelligence has entered a period of rapid diffusion across industries, transforming how organizations operate, innovate, and compete. Generative artificial intelligence (GenAI), often described as large language models, represents a significant development within this shift by enabling machines to produce text, code, and analytical outputs with increasing sophistication. These systems are now embedded in enterprise platforms, research infrastructures, and digital

ecosystems. They support decision-making, automate routine tasks, improve service delivery, and enhance productivity (Dwivedi et al., 2023; Goodfellow et al., 2016). Artificial intelligence is also used in high-stakes domains such as healthcare, transportation, and finance, where system outputs can affect individual well-being and broader social stability (Szadeczky, 2025). As adoption expands, GenAI is reshaping labor markets by altering entry-level roles that depend on routine cognitive tasks and by redefining workforce expectations and skill requirements (Brynjolfsson & McAfee, 2017). These developments place new demands on higher education institutions to prepare students for machine-augmented work and to establish governance structures that support responsible use.
Generative artificial intelligence is increasingly influencing teaching, research, and administration in higher education. Faculty and students use these tools for writing, coding, and knowledge production, reshaping how knowledge is created, evaluated, and shared (Kasneci et al., 2023; Selwyn et al., 2024). At the instructional level, these systems support more individualized learning pathways and enable timely, iterative feedback. At the institutional level, they expand faculty capacity in course design and research while improving operational efficiency (Holmes et al., 2022; Ouyang & Jiao, 2021).

At the same time, the rapid integration of AI introduces significant institutional and societal challenges. As a transformative force with broad implications across social, economic, and educational domains, artificial intelligence has generated extensive debate regarding the ethical principles, governance structures, and institutional values that should guide its development and deployment. Within higher education, concerns about academic integrity have intensified as generative systems complicate established notions of authorship, originality, and assessment (Bozkurt et al., 2023; Zawacki-Richter et al., 2019). Institutions must also address issues related to data privacy, algorithmic bias, transparency, accountability, and ethical oversight (Floridi et al., 2018; UNESCO, 2022). This convergence of opportunity and risk reflects a broader institutional tension in which technological innovation often advances more rapidly than the governance capacities needed to ensure responsible, transparent, and equitable implementation.
Recent evidence suggests that institutional readiness remains limited. Fewer than half of higher education institutions have established comprehensive policies or formal guidance for artificial intelligence, indicating a gap between technological adoption and governance capacity (EDUCAUSE, 2024; Ghimire & Edwards, 2024). This gap is structural rather than procedural, reflecting the absence of coordinated frameworks that integrate ethical oversight, data governance, and pedagogical guidance into institutional practice. At the same time, unequal access to artificial intelligence tools continues to raise concerns about the digital divide, with institutional leaders identifying equity as a central issue in implementation (Bond et al., 2024; Selwyn et al., 2024). These conditions highlight the need for governance approaches that go beyond compliance to support strategic alignment with the institutional mission, as well as transparency, accountability, and equity (Floridi et al., 2018; UNESCO, 2022).

Institutional responses have generally followed two approaches, neither of which fully addresses the conditions of higher education. One approach emphasizes macro-level policy frameworks such as the OECD AI Principles (2023) and UNESCO's (2022) recommendations. These frameworks establish normative benchmarks but provide limited operational guidance. The second approach focuses on technical risk management, as reflected in the NIST AI Risk Management Framework (2023). While this model offers lifecycle guidance, it was designed for industry contexts rather than for institutions characterized by distributed governance and faculty autonomy. As a result, governance efforts in higher education often take the form of reactive, isolated policies that address immediate concerns without developing an integrated strategy to manage AI systems throughout their lifecycle (Wu et al., 2024; Ghimire & Edwards, 2024).

This article addresses two questions. How can AI governance be reconceptualized to bridge the gap between ethical principles and institutional practice in higher education? What mechanisms are required to sustain governance as an ongoing organizational capability? To address these questions, this conceptual study draws on a systematic analysis of AI governance literature, institutional theory, and higher education scholarship to develop an

assurance-based lifecycle framework tailored to academic contexts. The framework defines governance as an integrated system that aligns ethical principles, institutional policy, and technical assurance processes, addressing the tendency for technological systems to develop without sufficient ethical grounding (Munn, 2023; Dignum, 2019).
The article makes three contributions. It adapts the concept of microethics to the institutional conditions of higher education. It specifies measurable indicators and responsible actors across lifecycle stages. It positions continuous assurance as an organizational capability that requires sustained resources, stakeholder engagement, and evaluative judgment. This approach supports translating ethical commitments into practice and strengthens alignment between AI adoption and institutional mission, equity, and student success (Taddeo & Floridi, 2018).

Literature Review

The following review examines how existing scholarship addresses the governance gap. It proceeds in three parts. First, it reviews research on GenAI adoption in higher education, which emphasizes applications and outcomes while giving limited attention to governance. Second, it examines AI governance literature beyond higher education and identifies a persistent implementation gap. Third, it analyzes emerging work on AI governance within higher education and shows that current approaches remain fragmented and underdeveloped. Together, these strands define the space for the proposed framework.

Generative AI in Higher Education

The rapid adoption of generative artificial intelligence in higher education reflects broader patterns of digital transformation in knowledge-intensive sectors. Applications include intelligent tutoring systems, predictive analytics, automated grading, and content generation tools, all of which can support learning outcomes and improve institutional efficiency (Holmes et al., 2022; Ouyang & Jiao, 2021). Recent studies show that artificial intelligence can support personalized learning by adapting instructional content to individual student needs (Bond et al., 2024; Khosravi et al., 2024). These systems also enhance engagement by enabling interactive learning environments and providing immediate feedback (Crompton & Burke, 2023; Luan et al., 2023).
These benefits are accompanied by significant challenges. Academic integrity remains a central concern because generative systems can produce outputs that resemble human-authored work (Kasneci et al., 2023). Questions about bias, misinformation, and reliability further complicate their use and raise concerns about trust in system outputs (Selwyn et al., 2024). The reliance on large datasets also introduces risks related to data privacy and surveillance, particularly when student data are collected and repurposed within institutional systems (Williamson & Eynon, 2020; Zeide, 2019).

Despite this growing body of work, the literature rarely addresses governance as an institutional capability. Most studies focus on applications, learning outcomes, or user behavior rather than on the organizational structures required to manage AI systems over time. This absence creates a gap that cannot be addressed by technical guidance or pedagogical frameworks alone. The review, therefore, turns to the broader AI governance literature.

AI Governance

Artificial intelligence governance focuses on the institutional arrangements that guide the development, deployment, and oversight of intelligent systems. Existing frameworks emphasize principles such as transparency, accountability, fairness, and human oversight (Floridi et al., 2018; OECD, 2023). These principles provide a normative foundation for aligning artificial intelligence with social values and organizational goals. However, reliance on principles alone often leads to an implementation gap in which ethical commitments are not translated into operational practice (Mittelstadt, 2019).

This gap reflects the need to consider social and institutional dimensions alongside technical design (Dignum, 2019; Stahl, 2021). AI systems operate within socio-technical environments shaped by organizational processes, cultural norms, and distributed decision-making. Their effects cannot be understood apart from these contexts. Effective governance, therefore, requires coordination between technical systems and institutional processes, including stakeholder engagement and ethical oversight.

Although there is broad agreement on governance principles, their implementation remains limited. Much of the literature defines what responsible AI should achieve but provides less guidance on how to sustain governance over time. This limitation is especially important given the dynamic nature of AI systems, which can change as they are exposed to new data (Batool et al., 2023). Static approaches are insufficient to maintain alignment with ethical and institutional standards. The literature increasingly calls for assurance-based models that support continuous monitoring and adaptation. Whether such models can be applied to higher education remains an open question.

AI Governance in Higher Education

AI governance in higher education is shaped by shared governance structures, academic freedom, and decentralized decision-making (Kezar & Eckel, 2004; Amey, 2021). These conditions require governance approaches that balance institutional accountability with participatory decision-making. Recent scholarship argues that effective artificial intelligence governance cannot rely solely on technical design or procedural compliance but must also incorporate active stakeholder involvement to maintain institutional legitimacy and trust (Knox & Know, 2025). Participatory governance structures that engage students, faculty, and staff in policy formulation, oversight, and system review help align artificial intelligence systems with pedagogical values, professional autonomy, and student needs. Effective oversight depends on coordination across stakeholders, including administrators, faculty, and students.

Current research points to fragmentation in institutional responses. Governance often takes the form of reactive policies that address specific concerns, such as academic integrity or data privacy, rather than integrated strategies (Wu et al., 2024; Ghimire & Edwards, 2024). This gap between policy and practice leads to inconsistent implementation across institutional functions.

Scholars also identify artificial intelligence literacy as a key component of governance (Mittelstadt, 2019). However, recent work suggests that functional literacy alone is insufficient. Stakeholders must also develop evaluative judgment to assess the quality and ethical implications of AI-generated outputs (Adamakis, 2025; Bearman et al., 2023). When these capabilities are not integrated into governance structures, adoption becomes uneven and may reinforce existing inequities.

Overall, current approaches remain underdeveloped. While high-level guidance is widely available, institutions lack operating models that address the full lifecycle of AI systems. Some institutions have begun to invest in auditing, risk assessment, and monitoring, but these efforts remain isolated rather than systemic. This gap defines the contribution of the present study, which proposes an assurance-based lifecycle framework designed for the governance conditions of higher education.

AI Governance Lifecycle Framework

To address the gap between principle-based guidance and institutional implementation, this article proposes an assurance-based lifecycle framework for artificial intelligence governance in higher education. Prior research has shown that ethical guidelines often remain operationally ineffective because they lack reinforcement mechanisms and are insufficiently connected to technical practice (Hagendorff, 2020; Mittelstadt, 2019). Many existing approaches rely on rule-based compliance, which can reduce ethics to procedural adherence without meaningfully shaping developer or institutional behavior. In contrast, the proposed framework conceptualizes governance as an adaptive, continuous

organizational process that evolves alongside the probabilistic and dynamic nature of artificial intelligence systems, requiring oversight throughout their full operational lifecycle (Batool et al., 2023; National Institute of Standards and Technology, 2023). The framework is designed as a "living" governance structure grounded in continuous review, refinement, and institutional learning, enabling institutions to expand oversight and transparency while remaining responsive to existing technical, operational, and staffing capacities (Knox & Knox, 2025). Drawing on the concept of microethics, defined as the integration of ethical reasoning into technical practice at a granular level, the framework connects institutional values with system design, implementation, monitoring, and ongoing accountability (Hagendorff, 2020).

The framework consists of five interconnected stages. The first stage, design and development, involves selecting, creating, or acquiring artificial intelligence systems. Governance at this stage focuses on data provenance, model assumptions, and bias mitigation. Risks often originate in design choices and training data, particularly when datasets do not adequately represent the populations they are intended to serve. Early attention to fairness and institutional alignment is therefore essential. Indicators at this stage emphasize the diversity and representativeness of training data and the extent to which model design reflects institutional priorities.

The second stage, predeployment validation, focuses on evaluating system performance before institutional use. This stage includes technical testing, scenario analysis, and ethical review to assess accuracy, robustness, and potential harms. Validation is not treated as a final checkpoint but as part of an ongoing governance process, recognizing that system behavior may change over time. Indicators at this stage assess whether system outputs are consistent across different user groups and whether error patterns are equitably distributed.

The third stage, institutional deployment, embeds governance within operational contexts. This stage integrates ethical oversight into routine institutional practices rather than treating implementation as a purely technical or administrative task. Governance mechanisms include access controls, defined roles and responsibilities, and coordinated oversight across units. These structures support accountability and ensure that institutional values guide the use of the system in teaching, research, and administration.

The fourth stage, continuous monitoring, establishes mechanisms for ongoing oversight after deployment. Artificial intelligence systems are dynamic and may change as they interact with new data, leading to shifts in system behavior over time (Batool et al., 2023). Continuous monitoring enables institutions to detect emerging risks and assess whether systems remain aligned with institutional goals (Mittelstadt, 2019). Indicators focus on the consistency of system outputs, the identification of unintended effects, and the effectiveness of review processes.

The fifth stage, adaptation and improvement, focuses on responding to insights generated through monitoring. This stage emphasizes evaluative judgment, defined as the capacity to assess whether system outputs align with ethical standards and educational objectives (Adamakis, 2025; Bearman et al., 2023). Governance in this phase is iterative and involves refining both technical systems and institutional policies. Actions may include updating models, revising governance protocols, or strengthening oversight structures. Indicators assess the extent to which feedback informs system changes and the timeliness of institutional responses to identified issues.

Across all stages, the framework is supported by cross-cutting mechanisms that sustain coherence and accountability. Ethical oversight anchors governance in principles such as fairness and human dignity. Regulatory alignment ensures compliance with legal and policy requirements. Stakeholder engagement supports inclusive decision-making, and transparency enhances institutional trust by making system processes and outcomes more visible (Floridi et al., 2018; Kezar & Eckel, 2004; Mittelstadt, 2019; UNESCO, 2022). Together, these mechanisms position the lifecycle framework as a practical approach to integrating ethical principles into institutional practice.

Figure 1

Lifecycle Stage	Primary Governance Focus	Key Performance Indicator (KPI)
1. Design & Development	Data Integrity & Bias Mitigation	Diversity and representativeness of training data; alignment between data composition and target population
2. Predeployment Validation	Technical & Ethical Robustness	Consistency of system outputs across user groups; distribution of error rates across demographic categories
3. Institutional Deployment	Operational integration and access governance	Rate of system adoption across units, volume, and type of user support requests
4. Continuous Monitoring	Drift Detection & Accountability	Stability of system outputs over time, frequency, and accuracy of oversight reviews
5. Adaptation & Improvement	Iterative Refinement & Policy Shift	Rate at which feedback informs system updates; time required to address identified issues

Implications for Higher Education

The proposed lifecycle framework provides an operational model for institutional leadership, shifting AI governance from fragmented, reactive policymaking to integrated, adaptive institutional strategies. As artificial intelligence becomes deeply embedded within the core functions of teaching, research, and administration, leaders must ensure that technological adoption is not merely a technical upgrade but a strategic alignment with the institutional mission, ethical commitments, and student success.

Leadership and Distributed Governance

Central to this transition is the recognition that higher education governance is inherently distributed and participatory. Effective implementation of the lifecycle model requires a shift from top-down mandates to coordinated engagement among faculty, administrators, and students (Kezar & Eckel, 2004; Amey, 2021). By embedding stakeholder engagement across all stages, the framework moves the institution beyond a "compliance-only" mindset toward a culture of collective responsibility. This approach helps ensure that AI deployment reflects shared institutional values, institutional legitimacy, and pedagogical priorities rather than isolated departmental interests.

Operationalizing Institutional Practice

The model provides clear operational priorities for various administrative layers. During the design and development phase, leadership must demand transparency regarding data provenance and model assumptions to mitigate latent bias (Floridi et al., 2018; Bender et al., 2021). In predeployment validation, institutions should adopt systematic risk assessments to establish benchmarks for reliability and fairness (NIST, 2023). Once in the **deployment** phase, governance must be operationalized through robust access controls and accountability structures that define the parameters of AI use in both academic and administrative settings (Williamson & Eynon, 2020).

Continuous Assurance and Strategic Priorities

The emphasis on monitoring and adaptation addresses the probabilistic and dynamic nature of AI systems. Because these systems evolve as they interact with new data, static compliance approaches are insufficient; institutions must instead establish "Continuous Assurance" mechanisms (Batool et al., 2023; Mittelstadt, 2019). This includes monitoring performance metrics, evaluating differential outcomes across student populations, and assessing the stability of decisions over time to preserve pedagogical integrity and institutional trust.

From this framework, three strategic priorities emerge for higher education leaders:

1. Infrastructure Integration: Governance structures must define clear roles and oversight responsibilities across the AI lifecycle. These frameworks should be woven directly into existing institutional processes rather than managed as siloed or peripheral initiatives. Embedding governance within institutional operations helps ensure consistent accountability across all stages of AI system use.
2. Literacy and Evaluative Judgment: Beyond basic functional literacy, institutions must prioritize the development of evaluative judgment among faculty and staff. Simple operational knowledge is insufficient to navigate the complexities of machine-augmented environments (Adamakis, 2025; Bearman et al., 2023). Cultivating evaluative judgment ensures that stakeholders possess the critical capacity to assess the ethical alignment of AI outputs—a foundational human requirement for the Adaptation and Improvement stage. This capacity enables institutions to translate technical monitoring into meaningful pedagogical and organizational refinement.
3. Equity and the Digital Divide: Proactive efforts are required to ensure that AI deployment does not exacerbate socio-economic inequalities or reinforce "digital-first" designs that marginalize underserved populations (Crompton & Burke, 2023; Selwyn et al., 2024). In the AI era, the digital divide extends beyond hardware access to encompass disparities in AI literacy and the quality of human-machine interaction (Bond et al., 2024; Khosravi et al., 2024). By applying the lifecycle framework, institutions can mitigate these risks during the Design and Predeployment stages, treating inclusive representation and equitable participation as foundational technical requirements rather than secondary policy considerations.

These implications position the lifecycle framework as a practical institutional model for translating abstract ethical principles into measurable organizational practices. Rather than treating governance as a static compliance function, the framework conceptualizes it as a continuous socio-technical process integrating technical assurance, institutional learning, and participatory accountability. By embedding continuous assurance within institutional operations, higher education leaders can foster responsible innovation while maintaining longitudinal accountability, institutional trust, and student success.

Conclusion

Artificial intelligence is fundamentally reshaping the academic landscape, influencing pedagogy, research methodologies, and institutional decision-making. While generative systems offer unprecedented opportunities for personalized learning and operational efficiency, they simultaneously introduce profound governance challenges concerning academic integrity, data privacy, and algorithmic equity. As this analysis has demonstrated, the current pace of technological adoption has outstripped institutional governance capacity, resulting in a landscape of fragmented, reactive policy responses that often remain operationally ineffective (Hagendorff, 2020).

This article responded to these challenges by proposing an assurance-based lifecycle framework for AI governance. By conceptualizing governance as a continuous and adaptive process—spanning design, validation, deployment, monitoring, and adaptation- the model provides a structured approach for translating abstract ethical principles into sustainable institutional practices. This shift from static, deontological compliance to dynamic assurance allows institutions to manage the inherent "drift" of intelligent systems while maintaining alignment with the

institutional mission. By integrating microethical checkpoints at every stage, this framework makes ethical considerations integral to technical implementation rather than a superficial addition (Hagendorff, 2020; Mittelstadt, 2019).

The implications for leadership are clear: the effective integration of artificial intelligence in higher education depends less on technical capability alone than on the strength of the governance infrastructure that guides its development, deployment, and oversight. To navigate an AI-augmented future, institutions must move beyond fragmented policies and avoid the pitfalls of "ethics washing" by investing in adaptive governance frameworks that prioritize transparency, participatory engagement, institutional accountability, and continuous improvement. By embedding assurance mechanisms into the institutional fabric, higher education leaders can position artificial intelligence as a catalyst for equity, institutional trust, and student success rather than a source of unmitigated risk. Future research should examine how adaptive governance frameworks evolve across institutional and cultural contexts, particularly in relation to participatory governance, student voice, and the long-term organizational effects of AI adoption.

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