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Adaptive Curriculum Management: Reconstructing Higher Education Curriculum Governance in the Age of Artificial Intelligence

Muhammad Thohri[1*], Muhammad Parhun[2]

[1]Universitas Islam Negeri Mataram, Mataram 83116, Indonesia
[2]STAI Nahdlatul Wathan Samawa, Sumbawa Besar, Indonesia
*Email of corresponding author: mthohri@uinmataram.ac.id

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Abstrak Perkembangan pesat kecerdasan buatan (AI), terutama AI generatif, menantang model manajemen kurikulum tradisional di perguruan tinggi yang biasanya mengandalkan siklus peninjauan berkala setiap 4 hingga 5 tahun. Artikel ini bertujuan untuk merumuskan ulang tata kelola dan manajemen kurikulum agar menjadi lebih adaptif di era AI. Melalui metode analisis konseptual berbasis *integrative systematic review* terhadap studi tata kelola kurikulum perguruan tinggi dan adaptasi AI dari tahun 2024 hingga 2026, ditemukan adanya kebutuhan mendesak untuk bergeser dari struktur kurikulum statis ke dinamis. Artikel ini menawarkan kerangka kerja Adaptive Higher Education Curriculum (AHEC) yang membagi komponen kurikulum menjadi lapisan stabil dan lapisan yang dapat diperbarui secara cepat. Hasil kajian menunjukkan bahwa manajemen kurikulum masa depan harus memanfaatkan Continuous Curriculum Intelligence berbasis AI untuk memantau perubahan kompetensi kerja secara waktu-nyata, namun keputusan akhir dan penafsiran maknanya tetap berada di bawah kendali penuh dosen dan institusi. Kesimpulan dari artikel ini menegaskan bahwa ketangkasan tata kelola manajerial merupakan kunci utama agar kurikulum perguruan tinggi tetap relevan dengan kebutuhan zaman harus jelas, ringkas, dan deskriptif.

Kata Kunci *Manajemen Kurikulum, Kecerdasan Buatan, Tata Kelola Pendidikan, Kurikulum Adaptif, Perguruan Tinggi*

Abstract The rapid development of generative artificial intelligence challenges traditional higher education curriculum management models that rely on rigid 4-to-5-year review cycles. This article aims to reformulate curriculum governance to become more adaptive in the AI era. Through a systematic integrative review of studies on higher education curriculum governance and AI adaptation from 2024 to 2026, a pressing need to shift from static to dynamic structures was identified. To address this mismatch, the article proposes the Adaptive Higher Education Curriculum (AHEC) framework, which strategically divides curriculum components into stable macro-level foundations and rapidly renewable micro-level contents. The findings reveal that modern curriculum governance must leverage AI-based Continuous Curriculum Intelligence to monitor shifts in professional competencies and job market requirements in real time. Crucially, the framework enforces human-centered authority, ensuring that human educators retain ultimate responsibility for final decision-making. The article concludes that agile managerial governance and organic institutional self-renewal are essential keys to ensuring that higher education programs maintain long-term professional relevance in an AI-mediated society.

Keywords *Curriculum Management, Artificial Intelligence, Educational Governance, Adaptive Curriculum, Higher Education*

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Introduction

Curriculum management in higher education has long relied on a stable idea: although knowledge continues to grow, the basic structure of academic fields and professional skills changes slowly enough to support major curriculum reviews every four or five years. This stability has allowed universities to use fixed, long-term review systems. The rapid growth of artificial intelligence, especially generative AI, has challenged this approach. AI tools can now produce written content, analyze data, write code, and create visual designs almost instantly. Their abilities also improve within months, far faster than traditional university review procedures can respond.

The main challenge is not simply adding new AI-related courses to existing programs. The larger issue is deciding how to manage education when access to information and advanced intellectual work is changing so quickly. When automated tools can complete complex tasks in seconds, memorizing a fixed set of information becomes less important. Students instead need to learn how to assess information, understand its meaning, adapt it to new situations, and use it responsibly. Liang, Stephens, and Brown (2025) highlight this shift by describing curriculum, teaching, and assessment as closely connected parts of the same system. As technology changes, these areas must develop together rather than being managed as separate elements.

Higher education institutions face a difficult management challenge. They must keep their curricula stable enough to preserve academic identity, educational goals, and accreditation requirements. At the same time, they need enough flexibility to keep pace with changes in the job market and prevent their programs from becoming outdated. For this reason, educational governance should move beyond making occasional updates to course content. Universities need a more adaptable system for managing their curricula. This article explores how curriculum governance can be redesigned through the Adaptive Higher Education Curriculum (AHEC) framework. The framework provides a practical balance by distinguishing between core educational elements that should remain consistent and areas of knowledge that need regular updates.

Methods

This study uses a structured review of existing research to examine how artificial intelligence may affect curriculum governance in higher education. This approach was chosen because the study focuses on the wider management and policy implications of AI, rather than only its specific effects inside the classroom. To build a strong conceptual foundation, the study draws on selected systematic reviews and research studies published between 2024 and 2026, a period of rapid technological change.

The review focuses on five main areas: AI's role in higher education curricula, changes to learning management driven by generative AI, the development of new student skills, assessment systems, and institutional governance. The selected studies were analyzed by theme to identify emerging changes in academic policies and management practices. By bringing together research on curriculum impacts published in 2025 and institutional responses observed in 2026, this study connects previously separate findings and presents a clear guide for managing curriculum governance in higher education.

Results

Paradigm Shifts in Curriculum Management

Recent research shows a major change in how educational management is studied. Earlier discussions often focused on individuals, such as how lecturers use artificial intelligence in teaching or how students use it to complete assignments. More recent research takes a broader view. It examines how entire educational institutions need to change because AI has become part of the wider environment in which they operate.

Table 1 explains the difference between traditional technology integration and deeper curriculum management reform. Traditional management models generally assume that existing curriculum documents are still suitable. In this approach, AI is mainly viewed as a tool for improving administrative efficiency. Adaptive curriculum management takes a more critical approach. It asks whether current learning outcomes, course structures, and assessment methods are still relevant in today's digital environment. Instead of simply adding AI to existing systems, institutions review their practices and make broader changes to keep education aligned with new technological conditions.

Table 1. Structural Comparison Between Static and Adaptive Curriculum Management

No	Management Dimension	Traditional Model (Static)	Adaptive Model (AHEC)
1	Review Lifecycle	Periodic and rigid (every 4–5 years)	Continuous, dynamic, and data-informed
2	Document Architecture	Monolithic (all content shares the same expiration rate)	Differentiated based on specific rates of change
3	Quality Assurance Focus	Standardization of content inputs and contact hours	Flexibility of learning pathways and capability fulfillment
4	Assessment Approach	Evaluating final static products (essays, reports, code)	Capturing higher-order reasoning and AI auditing processes

Strategic Differentiation of Component Change Rates

A major weakness in traditional higher education is the gap between slow academic processes and fast-moving technology. If a university tries to rewrite its entire curriculum every time a new AI model appears, it could overwhelm staff and disrupt daily operations. The Adaptive Higher Education Curriculum (AHEC) framework addresses this problem by allowing different parts of the curriculum to change at different speeds. Instead of treating the curriculum as one fixed document, it divides it into four layers, each with its own level of flexibility:

a. Stable Educational Purpose (Highly Stable): This foundational layer reflects the university's core mission, ethical responsibilities, commitment to human development, and key academic disciplines. It remains largely unchanged to maintain the institution's values and provide long-term consistency.

b. Evolving Competencies: This layer focuses on graduate profiles and Graduate Learning Outcomes (CPL). These competencies are reviewed regularly, usually every one or two years, to keep pace with changing professional standards, industry needs, and career opportunities worldwide.
c. Adaptive Learning Pathways: This operational layer focuses on course-level teaching and learning. It allows educators to use AI tools for personalized feedback, adaptive simulations, and active problem-based learning. As a result, students can receive support that better matches their individual needs and progress.
d. Renewable Knowledge Content (Highly Volatile): This layer includes case studies, datasets, tools, and practical examples that may change quickly. Educators can update this content each semester without going through a lengthy formal program re-accreditation process.

Discussion

Beyond Technological Fetishism: Institutional Adaptability and A-OBE

This study demonstrates that an academic curriculum is not rendered inherently adaptable simply through institutional investment in cutting-edge or capital-intensive artificial intelligence infrastructure. A university may deploy advanced AI suites, yet its curricular architecture remains fundamentally rigid if operationalized within antiquated learning structures, immutable credit hours, and fixed, linear competency goals. True systemic adaptability depends on the institution's capacity to leverage data dynamically and execute structural self-updates over time. This finding corroborates the cross-cultural assertions of Rosa and Yokomizo (2026), who argue that effective AI deployment must look beyond isolated classroom applications and fundamentally restructure macro-level educational governance. Recent bibliometric and experimental investigations in higher education reinforce this premise, emphasizing that sustainable AI integration requires moving away from piecemeal applications toward unified, adaptive systems that directly enhance institutional learning outcomes (Al-Sharafi et al., 2026). To preserve external relevance amid fluid workforce transformations, universities must replace the historical, rigid review cycles of traditional Outcome-Based Education (OBE) with Adaptive Outcome-Based Education (A-OBE). Powered by Continuous Curriculum Intelligence, A-OBE leverages automated data engines to continuously parse global labor market fluctuations, evolving competency taxonomies, and frontier scientific discoveries in real time, shifting the institutional paradigm from reactive, retrospective overhauls to ongoing, predictive curricular optimization.

The Human-in-the-Loop Imperative and Governance Boundaries

While automated engines excel at tracking macro-economic shifts and parsing student performance data, this study enforces a definitive operational boundary for higher education governance: AI operates as an analytical agent, whereas human faculty retain absolute epistemic and evaluative control. Algorithms lack the contextual nuance, cultural empathy, and ethical reasoning required to articulate a university's core educational mission; therefore, excessive reliance on algorithmic recommendations risks introducing severe data bias and systemic technostress into the academic ecology (Sabani, 2024). Comprehensive policy and governance

reviews substantiate this caution, indicating that while adaptive AI platforms create unprecedented opportunities for accessibility and personalization, they simultaneously introduce critical gaps in assessment validity and academic integrity that require rigorous human oversight (Ouyang & Chang, 2026). Mixed-methods curricular research explicitly demonstrates that students view AI preparedness as a multidimensional professional competence rather than merely a matter of tool access (Nguyen & Vo, 2026). Consequently, faculty leadership must serve as the ultimate evaluative filter, ensuring that automated insights support humanistic values while designing robust, process-oriented assessment models that evaluate how students audit, refine, and critically contextualize AI outputs rather than grading a final, easily automated product.

Process-Oriented Assessment Engineering in the Generative AI Era

The capacity of generative AI to instantly construct high-quality essays, production-ready source code, and comprehensive technical reports has structurally compromised traditional product-oriented evaluations. When final deliverables can be fully automated, grading the static output becomes an invalid measurement of student learning. Consequently, higher education curriculum policies must intentionally pivot toward process-oriented assessment models that prioritize the cognitive trajectories students follow to reach their conclusions. Instructors should re-engineer assessment criteria to evaluate how students formulate complex inquiries, synthesize contradictory evidence, critically audit AI-generated content for underlying biases, and engage in metacognitive reflection regarding their technological dependencies. Empirical evidence confirms that substituting late-stage summative products with continuous formative assessments effectively preserves academic integrity while cultivating deeper cognitive engagement (Hwang et al., 2026). Rather than penalizing technological adoption, educational systems must award explicit credit for a student's capacity to verify, enhance, and defend AI outputs, transitioning the learner's role from a passive user to an active editor and critical supervisor (Lim & Abdullah, 2026).

Structural Decoupling and the Operational Mechanics of the AHEC Framework

This pedagogical paradigm shift highlights a chronic structural vulnerability in contemporary higher education governance: the profound operational mismatch between the rapid velocity of technological innovation and the structural inertia of institutional administration. While professional software applications and workplace skills mutate over the span of months, traditional university review cycles operate on rigid four- to five-year timelines, inevitably guaranteeing the obsolescence of modern degree programs. The Adaptive Higher Education Curriculum (AHEC) framework systematically resolves this tension by executing a structural decoupling of the institutional curriculum. By isolating a *Stable Core Layer*—consisting of invariant foundational theories, universal critical thinking methodologies, and ethical frameworks—from a hyper-flexible *Dynamic Rapid-Update Layer* dedicated to ephemeral datasets, temporary software applications, and current industry use cases, institutions can update operational learning materials every semester. This dual-layer architecture allows universities to remain aligned with market needs without triggering prolonged, costly, and bureaucratically exhausting institutional re-accreditation pathways. Ultimately, effective educational leadership

in an automated society does not rely on predicting future software developments; rather, it requires building resilient, elastic institutional governance structures that prioritize adaptable human capabilities over static information transfer (Westerman & Chen, 2026).

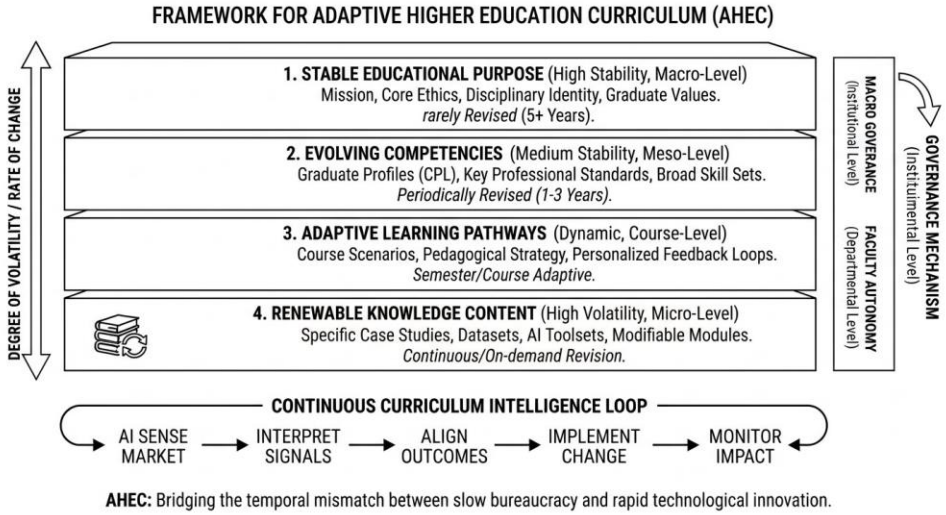


Figure 1. Architectural Framework for Adaptive Higher Education Curriculum (AHEC) and Its Continuous Governance Intelligence Loop

As shown in Figure 1, the Adaptive Higher Education Curriculum (AHEC) framework addresses the gap between academic administration and the rapid pace of technological change by organizing curriculum content into layers that change at different rates (Farah et al., 2026). The framework follows a vertical structure based on stability. Its core institutional elements remain protected from frequent technological changes, while its practical components can be updated more easily (Arifin, 2024). At the top, Layer 1 defines the long-term purpose of education. It focuses on lasting values and core disciplinary identities that rarely need revision. This layer provides an ethical foundation and helps prevent technology from determining educational priorities on its own (UNESCO Regional Office, 2026).

Layer 2 focuses on graduate skills and target profiles. These elements are updated over time to keep pace with changes in industry expectations. The lower layers are more flexible. Layer 3 supports personalized learning pathways by adapting teaching methods and activities to each student's needs and progress (Silva et al., 2024). Layer 4 includes the most frequently updated materials, such as recent case studies, software tools, and modular data resources. Faculty members can revise these materials regularly without redesigning entire academic programs or completing lengthy administrative processes (Tan et al., 2025). The AHEC model operates through a continuous data cycle called the Continuous Curriculum Intelligence Loop, shown at the base of Figure 1. Instead of relying on traditional curriculum reviews conducted every few years, this system connects data analysis with institutional decision-making through five stages: sense market changes, interpret signals, align learning outcomes, implement changes, and monitor results (Ouyang & Jiao, 2026). Digital systems collect information from changing job markets, student learning patterns, and emerging technology needs. However, the model keeps human educators at the center of decision-making. While automated tools identify trends,

educators are responsible for understanding what those trends mean for teaching and for deciding how policies and curricula should change (Efendi et al., 2025).

Overall, this approach moves beyond traditional outcome-based education. It creates a more flexible form of Adaptive Outcome-Based Education (A-OBE), which maintains consistent academic standards while allowing programs to respond quickly to new needs.

Conclusion

Artificial intelligence is pushing universities to rethink how they manage their curricula. Curriculum plans can no longer remain fixed documents that are updated only once every five years. The proposed Adaptive Higher Education Curriculum (AHEC) framework offers a more flexible approach. It separates long-term educational goals from course content that may change as technology, industries, and social needs evolve. This allows universities to update their programs more regularly without creating unnecessary disruption. In the age of artificial intelligence, a university's success will not depend on how accurately it predicts the future. It will depend on how quickly and effectively it can review its curriculum, replace outdated assumptions, and keep learning relevant to the real world.

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Conflict of Interest The author declares that there is no conflict of interest regarding the publication of this article.

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