



Empowering Higher Education with Generative AI: A Systematic Review from the Dual Perspectives of Project Control and Humanistic Ethics

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Abstract. To clarify the research context, challenges, and governance of Generative AI (GenAI) in higher education, this study uses large - scale engineering project control and humanistic ethical governance perspectives to review and analyze core literature. The results show that GenAI application in universities has seen mechanism evolution and structural changes. In instruction, it has a conjugate effect on personalized learning and forms collaborative networks. It also causes tensions in teachers' professional ecology, widens the digital divide, and undermines educational equity. Governance - wise, advanced models bring new data risks, forcing a shift in academic governance from rigid control to empowerment. But existing studies focus on fragmented responses, lacking full - cycle planning and humanistic value orientation. Therefore, based on project management control and educational ethics, this study constructs an "technological empowerment—project control—ethical governance" framework for university teaching, learning, and administration. It aims to prevent technological alienation and capability substitution, providing support and guidelines for GenAI implementation in higher education.

Keywords: Generative AI; higher education; project management; humanistic ethics; complex tension; trinity framework

1 Introduction

In the context of the profound integration of global digital education transformation and artificial intelligence, generative artificial intelligence (GenAI) has emerged as a crucial driving force for higher education reforms. Since 2023, GenAI applications in Chinese higher education have rapidly advanced from conceptual discussion to practical implementation, with the Ministry of Education and top universities issuing relevant policy guidelines. GenAI has been incorporated into the core framework of teaching reform, scientific research innovation and modern governance, serving as a strategic underpinning for high-quality higher education development, and relevant research has shown explosive growth^[1,2]. Chinese academic communities have carried out comprehensive research on the theoretical exploration, practical application, and risk governance of

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Generative Artificial Intelligence (GenAI) in higher education. The research achievements are characterized by multi - dimensional and interdisciplinary features, encompassing technological applications, teaching practices, administrative regulations, and humanistic ethics. [3,4].

The large-scale and regular application of GenAI in universities is essentially a systematic project with long cycles, diverse scenarios, high risks and strong collaboration needs, which shares inherent consistency with large-scale cluster projects in objective coordination, whole-process control, resource allocation and risk prevention. It is by no means simple software procurement but a highly complex "large-scale cluster project". Wu T. et al. pointed out that large-scale cluster projects are characterized by profound uncertainty and multi-agent collaboration, and conventional fragmented management cannot achieve efficiency improvement and effective risk control^[5]. Thus, only by adopting complexity reduction governance through hierarchical institutional decomposition and iterative decision-making decomposition can we resolve practical obstacles in GenAI campus implementation, establishing the logical rationality of integrating project management theories into GenAI applications. GenAI campus implementation involves teaching adaptation, platform construction and teacher training, while balancing computing resource investment, cost efficiency, quality and security—consistent with project management's core concepts. Its introduction in universities covers top-level design, operation and maintenance, effect evaluation and dynamic adjustment, conforming to the "planning—implementation—monitoring—correction" paradigm. Meanwhile, Zhang C L.'s concepts of rational resource allocation and benefit maximization in construction engineering cost control can be transformed into a balancing mechanism for university computing resources, platform costs and teaching-research benefits, consolidating practical rationality^[6].

From a humanistic and ethical standpoint, the in - depth penetration of Generative Artificial Intelligence (GenAI) has reconfigured teaching and research paradigms, simultaneously giving rise to risks such as data infringement, algorithmic black boxes, and information cocoons^[7-9]. By interpreting the UNESCO Guidance for Generative Artificial Intelligence in Education and Research, Wang W. et al. clarified that technological empowerment must not deviate from educational essence and humanistic values; blind pursuit of instrumental rationality may lead to academic misconduct, educational alienation and widened digital divides^[10]. Thus, GenAI's stable development in higher education must adhere to humanistic values, aiming to enhance higher-order thinking rather than replace human capabilities^[11,12], activate higher-order cognition and support personalized education^[13]. Universities should uphold educational equity, academic integrity, data security and authentic education to bridge digital divides^[14,15], completing ethical justification for GenAI in higher education.

GenAI also brings profound challenges including academic integrity crises, data security threats and weakened humanistic values^[16,17], revolutionizing educational research paradigms^[18] and disrupting learning evaluation systems^[19]. Relying on technology or traditional educational experience alone is insufficient for effective governance. A closed - loop system based on systematic management thinking is needed. This study, using project management's whole - process logic and humanistic ethical orientation, overcomes single - perspective limitations. By systematically collating recent high -

quality literature, it's found that existing research covers diverse scenarios and risk analyses, but has scattered perspectives, fragmented content, and insufficient interdisciplinary integration, especially a lack of dual - theoretical integrated analysis. This systematic review aims to clarify research trajectories, consolidate core viewpoints, identify research gaps, and lay a foundation for theoretical and practical progress. It also aims to balance technological empowerment and ethical constraints through project management integration.

From the dual perspectives of whole - process project management and humanistic ethical governance, this review synthesizes the practical applications, challenges, and governance strategies of Generative Artificial Intelligence (GenAI) in higher education. It aims to offer theoretical and practical guidance for the standardized and secure implementation of GenAI in universities, facilitate the integration of technological empowerment, educational principles, ethics, and project management, and support the high - quality digital transformation of higher education.

2 Research Design

2.1 Research Questions and Search Strategies

Based on a systematic review of the extant literature, this study centers on the practical applications, dilemmas, and governance approaches of Generative Artificial Intelligence (GenAI) in higher education. Three core research questions are formulated regarding the application status, key challenges, and optimization strategies. Adhering to standardized systematic review procedures, rigorous literature retrieval strategies were devised to guarantee the systematicity and authority of the research.

The retrieval period spanned from April 2023 to January 2024. Documents were primarily sourced from CSSCI - indexed journals, with the China National Knowledge Infrastructure (CNKI) serving as the core platform. Core keywords encompassed technical terms (such as "generative AI", "generative artificial intelligence", "GenAI"), domain - specific terms (including "higher education", "university", "teaching innovation", "personalized learning"), and problem - oriented terms (like "challenge", "risk", "countermeasure", "governance", "ethics", "data security"). Logical combinations of these keywords constituted retrieval formulas, comprehensively covering interdisciplinary studies to establish a robust data foundation for subsequent screening.

2.2 Literature Selection

To guarantee academic rigor, relevance, and validity, stringent inclusion and exclusion criteria were established, and the selection procedure adhered to the PRISMA guidelines.

The inclusion criteria gave precedence to journal articles, as well as theoretical and empirical studies concentrating on the application, challenges, countermeasures, ethics, and data security of Generative Artificial Intelligence (GenAI) in higher education. In particular, high - quality findings that support perspectives on project management, hu-

manistic ethics, and risk control were prioritized. The exclusion criteria excluded documents that were irrelevant to higher education (e.g., basic education or pure technical development), non - academic popular articles, news briefs, duplicate papers, and those with incomplete information.

The four - stage screening procedure (as depicted in Figure 1) was as follows: (1) The initial retrieval generated 186 records; after removing 32 duplicate records, 154 records remained. (2) The preliminary screening (title/abstract review) excluded 103 papers deemed irrelevant (including 4 papers on basic education, 31 papers on pure technical development, and 25 news briefs or popular science articles), leaving 51 papers. (3) The full - text eligibility evaluation excluded an additional 25 papers (9 papers lacking rigorous academic reasoning, 7 papers with incomplete available data, 9 papers unrelated to core themes such as AI educational application, management, or ethical norms), resulting in 26 high - quality papers in the end. These 26 papers, with coherent themes and robust argumentation, comprehensively mirror the overall research advancement of GenAI in higher education.

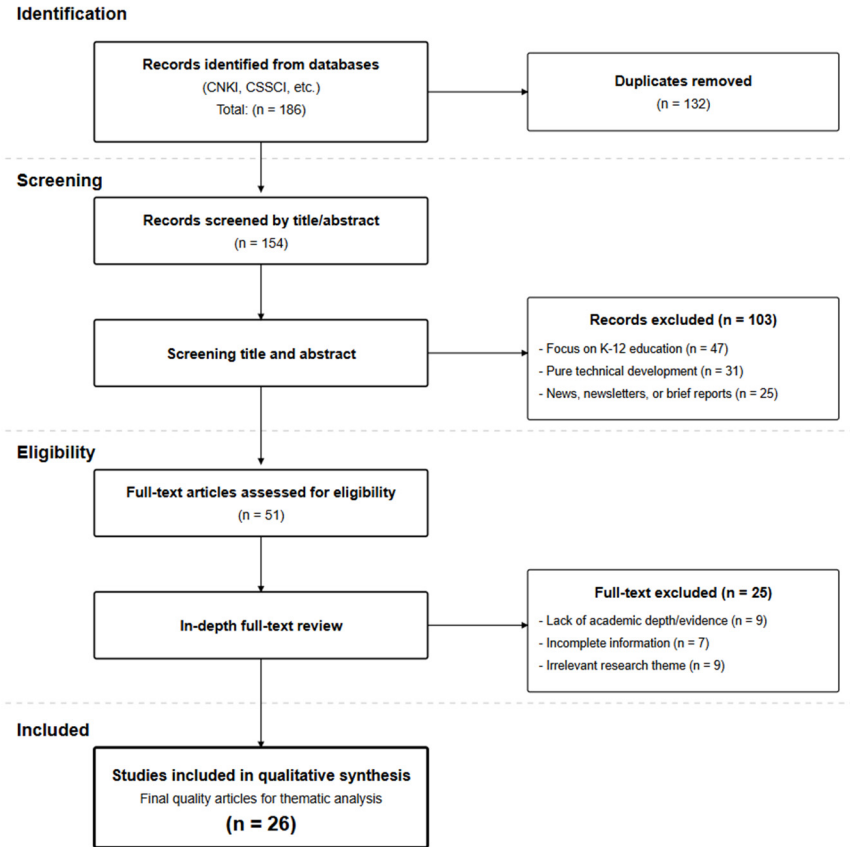


Fig. 1. PRISMA flow diagram of literature search and selection

Notably, despite an extensive initial retrieval pool, only 26 papers were ultimately included. This is attributed to the study's stringent interdisciplinary screening criteria, which are in line with its dual perspectives (complexity degradation project management and humanistic ethical governance). During the full - text screening stage, a substantial number of superficial papers (such as those featuring simple technical function descriptions, general macro - countermeasure discussions, or simple summaries of teaching experience) were excluded. This "small - yet - precise" strategy ensures the theoretical depth, rigorous argumentation, and perspective alignment of the included literature, thereby guaranteeing the scientificity and focus of the review's core framework construction.

3 Statistical Analysis of Literature

This study conducted a statistical analysis of the ultimately included high - quality literature from the aspects of annual distribution, research themes, and research perspectives. It objectively disclosed the research trends of GenAI in higher education and emphasized the innovative perspectives of project management and humanistic ethical governance in this review.

3.1 Publication Timeline

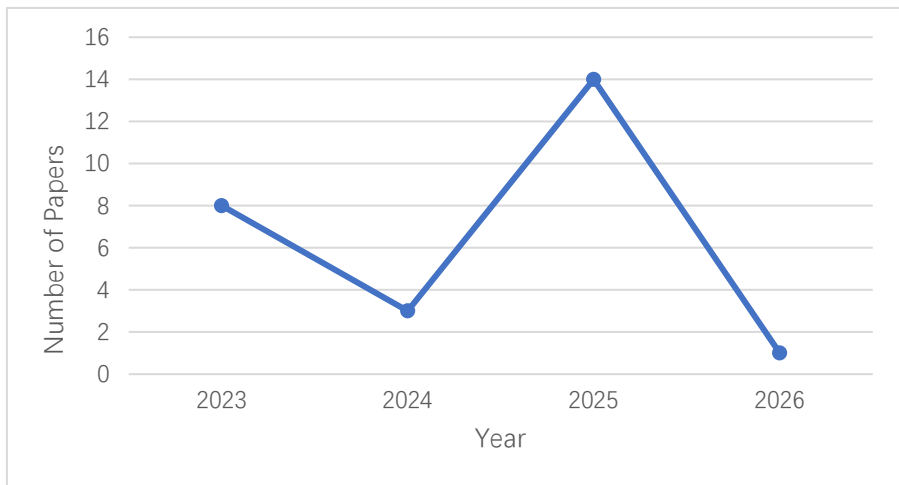


Fig. 2. Annual distribution of included publications

The 26 included papers span from April 2023 to January 2026 (refer to Figure 2). Specifically, there are 8 papers in 2023, concentrating on the educational application scenarios, operational logic, preliminary ethical risks, and international perspectives of GenAI, with an emphasis on the fundamental issues of technology introduction in education. In 2024, 3 papers conduct in - depth analyses on data security, smart platform

risks, and educational humanistic values, focusing on refined risk governance and ethical norms. The year 2025 witnesses an explosive growth period, with 14 papers covering teaching innovation, teachers' professional ecology, students' AI literacy, university response strategies, copyright regulation, and academic integrity, accompanied by enriched theoretical and empirical research. In 2026, 1 paper focuses on the educational logic reconstruction of AIGC detection systems, reflecting forward - looking reflections on technical governance.

3.2 Research Themes

Existing studies show multi-dimensional and focused characteristics (see Figure 3):Core theme: Teaching application and practical innovation, exploring AI-enabled teaching reform, personalized learning, smart textbooks, and learning evaluation transformation.Second major theme: Ethical risks and governance regulation, focusing on academic integrity, data security, copyright protection, ethical constraints, and institutional construction.Additional themes: Educational subjects, literacy, and research paradigms, discussing teachers' and students' AI literacy, changes in teachers' professional ecology, and educational research paradigm transformation. These three themes form a complete research system.

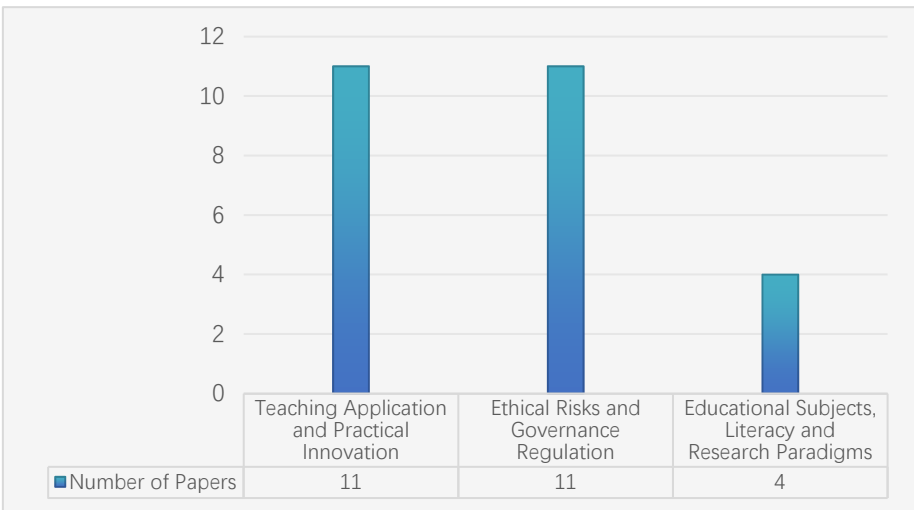


Fig. 3. Distribution of included publications by research theme

3.3 Research Perspectives

Existing studies are dominated by the educational discipline perspective with interdisciplinary integration trends (see Figure 4):Largest share: Literature on educational teaching and technological application, analyzing technology-enabled pathways from

pedagogy and educational technology perspectives. Second: Studies from ethics, security and governance perspectives, integrating law, ethics and public administration theories for risk prevention and institutional construction. Additional: Literature from project management and resource control perspectives, providing management support for GenAI's large-scale deployment, whole-process promotion and benefit optimization in universities. This distribution lays a solid foundation for constructing the "technology empowerment – project control – ethical governance" trinity framework.

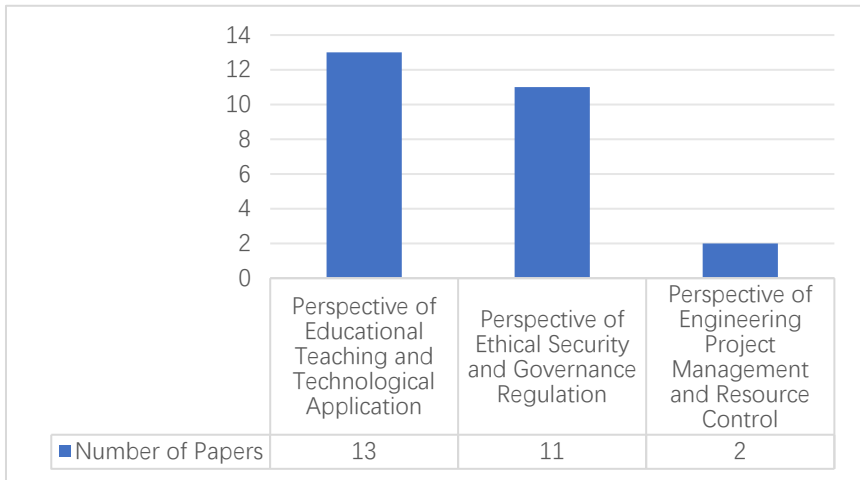


Fig. 4. Distribution of included publications by research perspective

4 Thematic Analysis from the Dual Perspectives of Project Control and Humanistic Ethics

An integration of existing literature from the management perspective reveals that current research on generative AI (GenAI) in higher education centers on three main threads: practical implementation, subject transformation, and risk governance, which can be systematically summarized into three core themes, namely instructional application, subject influence, and governance challenges. Most existing studies are conducted from single dimensions such as technology, education, and law, while interdisciplinary integrated research combining the whole-process control, objective orientation, and closed-loop risk management of project management with humanistic care and ethical regulation remains markedly insufficient. This gap constitutes the core starting point for the thematic analysis of the present study.

4.1 Instructional Application: From Tool Assistance to Ecosystem Restructuring

The profound reshaping of higher education teaching driven by GenAI has become a central focus of academic attention. Innovative practices and theoretical explorations

of technology-empowered teaching continue to advance, gradually forming concrete operational mechanisms and innovative models. Existing studies indicate that GenAI restructures the teaching ecosystem through refined technical logic. Integrated analysis adopting the dual perspectives of project management and humanistic ethics can not only resolve practical dilemmas in implementation but also uphold the fundamental essence of education.

From the perspective of project management combined with instructional mechanism interpretation, the deployment of GenAI in teaching scenarios is far more than simple tool implantation; instead, it represents a complex educational implementation project characterized by deep uncertainty and multi-agent collaboration, which cannot achieve long-term empowerment through static one-time deployment. Wu T. et al. argued that large-scale cluster projects inherently feature profound uncertainty and multi-party coordination and require effective control via a complexity reduction framework, a theory fully applicable to the implementation logic of GenAI teaching applications in universities^[5]. Given the dynamic nature of instructional practice, the “iterative decision-making reduction” approach can be adopted to establish an agile management model of “learning-feedback-iteration”, realizing full-cycle overall control over teaching objectives, resource input, implementation procedures, and outcome evaluation. Zhang C L. emphasized that the core of engineering cost control lies in optimal resource allocation and benefit maximization, a concept directly transferable to the allocation strategy of AI teaching resources in universities, improving application efficiency and avoiding waste of computing and human resources^[6].

Within this framework, the internal mechanisms underlying diverse instructional applications become clear. First is the conjugate effect in personalized learning. Jiang C C. et al. pointed out that Generative AI assists in generating learning materials, optimizing learning strategies, planning learning pathways, and constructing learning environments, achieving dynamic balance among multiple elements and breaking the contradiction between standardized instruction and personalized demands, thereby accelerating the large-scale implementation of personalized learning^[13]. Second is the four-agent collaboration model of digital textbooks. Hu J S. et al. illustrated that new form digital textbooks for college foreign language teaching constructed based on the iTELL framework establish a collaborative interactive network of “teacher–AI–student–textbook” with textbooks as the interactive hub, alleviating the imbalance of instructional roles induced by GenAI^[20]. Third is the Chain-of-Thought (CoT) cognitive scaffolding in academic retrieval instruction. Gong F R. and Chen Y R. proposed constructing a teaching agent based on large language model CoT prompting with a “five-step search method”, transforming fragmented traditional retrieval procedures into interpretable cognitive scaffolding designed to cultivate students’ advanced information literacy and critical thinking competencies^[21]. Furthermore, taking the Massachusetts Institute of Technology as a case study, Xia Q. et al. verified that GenAI can be deeply embedded across curriculum design, instructional delivery, and teaching evaluation, empowering innovative reform of teachers’ instructional models^[22]. Zhang L. found that adaptive writing feedback systems driven by generative AI provide targeted and precise instructional support for specialized courses, highlighting the exclusive educational value of AI tools^[23].

Achieving two-way integration grounded in humanistic ethics, all the above instructional innovations must adhere to humanistic fundamentals and avoid the one-sided pursuit of efficiency in project management at the expense of educational essence. Interpreting UNESCO guidelines, Wang W. et al. stressed that the educational application of GenAI must uphold humanistic orientation and guard against educational risks arising from technological alienation. This means GenAI should be positioned fundamentally as a learning scaffold rather than capability substitution. Instructional design throughout the process needs to strengthen student autonomy and critical thinking while preventing thinking inertia caused by over-reliance on technology^[10]. Whether realizing the conjugate effect of personalized learning, operating the four-agent collaborative network, or deploying CoT-based intelligent teaching agents, all practices must prioritize cultivating students' higher-order cognition and safeguarding educational equity. The whole-process control of project management and the value orientation of humanistic ethics should coordinate mutually to prevent technological tools from alienating and undermining educational essence.

In summary, extant literature predominantly focuses on the technical functions and isolated classroom applications of GenAI and explores the practical value of innovative models in depth. Nevertheless, few studies deeply integrate whole-process control and objective coordination from project management with systematic humanistic ethical embedding. There is a lack of dynamic and standardized engineering design covering entire teaching workflows, as well as closed-loop instructional governance integrating technological empowerment and ethical constraints, hindering the high-quality and sustainable development of GenAI pedagogy in higher education.

4.2 Impact on Stakeholders: Reconstruction of Teachers' and Students' Behaviors and Competencies

The widespread adoption of GenAI profoundly reshapes behavioral patterns, competency structures, and developmental ecosystems of teachers and students in higher education, subverting interactive logic and traditional developmental paradigms in education. Such subject influences are no one-sided positive empowerment but bidirectional interactions filled with complex tensions and digital divides, requiring objective examination and systematic responses.

Regarding teachers, the shaping of professional ecosystems by GenAI presents evident complex tensions between empowerment and increased workload. Through empirical research, Bao W. and Wan Y H. clearly confirmed that under intelligent digital empowerment, the application of GenAI generates remarkable contradictory effects. Although frequent GenAI use effectively stimulates teachers' innovative vitality in classroom teaching and facilitates academic output offering technical support for teaching and research optimization, it fails to reduce occupational pressure. Instead, challenges such as technical adaptation, tool debugging, and multi-scenario application further increase comprehensive workloads covering teaching, research, and administrative affairs, even exerting latent negative impacts on teachers' professional identity^[16]. Meanwhile, according to Zhou J L. and Liu H M., popularization and normative re-

quirements of AIGC detection technologies compel teachers to adjust classroom management behaviors and restructure evaluation logic, further transforming conventional instructional practices^[17].

In terms of students, competency reconstruction driven by GenAI is accompanied by prominent group disparities and digital divide risks verified by objective assessment data. Zheng X R. et al. demonstrated structural differences in AI literacy among undergraduates from top universities: male students show advantages in AI knowledge reserve, whereas female students perform better in practical application assessment and ethical judgment. Crucially, students from low-income families score significantly lower in AI knowledge mastery and technical operation competencies. Disparities in family backgrounds and resource accessibility exacerbate educational inequity and widen the digital divide amid GenAI popularization^[24]. Additionally, from the perspective of value guidance, Wang Y K. and Mi H Q. argued that GenAI reshapes not only student learning behaviors and cognitive modes but also ideological perceptions and value orientations. Without positive guidance in ideological and political education scenarios, students may suffer biased value judgment and weakened independent thinking capacity^[25].

From an integrated management perspective, competency development and behavioral guidance for teachers and students constitute a long-term educational project featuring sustainability and dynamics. The whole-process governance philosophy of project management can be adopted to set hierarchical objectives, conduct full-cycle tracking monitoring, and implement closed-loop effect evaluation for AI literacy cultivation. Simultaneously, humanistic and ethical orientation must be maintained. Yang J F. et al. highlighted the necessity of preventing technological erosion of subjectivity and adhering to the fundamental orientation of student-centered education^[11].

Overall, existing literature mostly explores unidirectional impacts of technology on individual behaviors, competencies, and psychology of teachers and students, emphasizing superficial elaboration and partial empirical analysis. Although prior findings identify complex tensions within teachers' professional ecosystems and digital divides among student groups, integrated systematic research covering humanistic management, organizational arrangement, and engineered whole-process optimization remains scarce. Current scholarship fails to construct sustainable student-oriented educational governance balancing equity and efficiency or effectively resolve developmental contradictions induced by AI empowerment.

4.3 Governance Challenges: Ethical Risks and Institutional Countermeasures

With the deep integration of GenAI across comprehensive higher education scenarios, compound governance crises including ethical anomie, data security threats, academic misconduct, and copyright disputes emerge intensively, making risk response and institutional construction core academic priorities. Traditional governance relying merely on isolated technical supervision and fragmented institutional revision can no longer adapt to complex practical demands. Adopting the integrated dual framework of whole-process project control and humanistic ethical guidance, GenAI governance in

higher education is essentially a systematic project characterized by complexity, dynamics, and multi-party collaboration, balancing technical regulation, humanistic bottom lines, operational efficiency, and holistic closed-loop governance.

Fundamental governance dilemmas stem from outdated governance concepts, inadequate technical adaptation, and fragmented regulatory systems. Combined with cutting-edge large model characteristics and theoretical progress, core challenges and optimization directions can be categorized into three dimensions:

First lies in conceptual deviation and transformation dilemmas regarding AIGC detection. Many universities overly rely mechanically on AIGC detection rates for academic supervision adopting rigid control strategies centered on preventing AI ghostwriting and academic fraud. Zhou J L. and Liu H M. pointed out two fundamental logical flaws inherent in such models. First, mainstream detection tools suffer high error rates due to iterative model updates, frequently mislabeling authentic student work as AI-generated content and undermining academic enthusiasm. Second, such mechanisms adopt a presumption of guilt regarding ghostwriting, violating educational fundamentals and ignoring legitimate student demands for AI-assisted inquiry and learning^[17]. From the objective control perspective of project management, academic integrity governance should abandon rigid detection dominance and shift toward empowerment-oriented governance. Assessment priorities should transfer from formal statistics of AI generation ratios to substantive evaluation of academic quality and students' higher-order competency development, reconstructing an academic governance closed loop integrating procedural supervision and competency orientation while safeguarding humanistic ethics, academic autonomy, and innovative thinking cultivation.

Second concerns emerging data security risks posed by advanced large models such as DeepSeek. Unlike early ChatGPT models relying heavily on supervised fine-tuning based on massive pre-training datasets, DeepSeek adopts advanced architectures including multi-head latent attention mechanisms, Mixture-of-Experts (MoE) modules, and pure reinforcement learning workflows without conventional supervised fine-tuning, triggering novel hidden risks such as factual deviation and model hallucination alongside latent privacy infringement. Zong S H. and Luo S L. confirmed that eliminating supervised fine-tuning leads to poor output controllability, frequent factual distortion and hallucination, and implicit privacy capture during model training and reasoning, rendering conventional encryption and access control ineffective. Drawing on proactive risk prevention concepts from project management, dual refined regulation covering data input and output terminals should be enforced, together with establishing algorithm interpretability rights requiring developers to disclose core decision logic and eliminate algorithmic black boxes^[7]. Furthermore, Zhao Z Y. emphasized that data security risks extend beyond explicit leakage to implicit illegal capture and secondary exploitation of teaching and research data, necessitating full-life-cycle compliance review mechanisms to consolidate campus data protection barriers^[8].

Third refers to insufficient copyright regulation systems and lagging governance paradigms. Disputes over copyright of training datasets and ownership of AI-generated content continue to intensify. Massive unauthorized extraction of copyrighted academic literature and teaching resources during model training easily triggers infringement disputes, while ambiguous criteria for originality judgment and content ownership further

complicate copyright practice within universities^[9]. Integrating data risk prevention strategies proposed by Zhao Z Y., rigid regulation should be replaced by an agile and resilient multi-stakeholder collaborative governance model. Copyright governance adopts a three-tier systematic framework: liberal front-end arrangements supporting fair use and legal exemptions, in-process supervision via meta-regulation and market autonomy, and back-end legal accountability safeguards. From engineering cost control logic, such optimized allocation reduces compliance costs while balancing technological innovation and copyright protection, conforming to efficiency maximization principles in project management.

Consensus on multi-agent research converges upon unified ethical orientation and governance demands. Yin B. and Zhuang X Y. noted that uncontrolled academic writing abuse of GenAI erodes academic integrity and fundamental writing competencies, requiring clarified ethical boundaries, hierarchical usage specifications, and strengthened humanistic ethical cultivation to shape positive academic values among teachers and students^[14]. Summarizing practices of top U.S. research universities, Tian F. and Lu C Y. adopted classified guidance and flexible supervision strategies establishing differentiated AI criteria across disciplines and teaching stages alongside collaborative university-local and university-enterprise platforms, offering valuable international experience for localized institutional improvement^[26]. Integrated with project management theories proposed by Wu T. et al., objective control paradigms for large cluster projects emphasizing full-cycle planning, dynamic adjustment, and multi-party coordination apply perfectly to university GenAI governance^[5]. A comprehensive closed-loop system of "planning - implementation - monitoring - correction" ought to be established, with risk prevention, ethical constraints, and resource allocation permeating the entire process, so as to achieve the in - depth integration of technological regulation, institutional optimization, and humanistic governance.

To conclude, existing scholarship effectively identifies core risks involving ethics, data security, copyright, and academic integrity and provides scattered countermeasures from legal, institutional, and technical perspectives. However, a holistic framework deeply integrating whole-cycle project management control and humanistic ethical orientation remains absent. Targeted specialized schemes for emerging large models and resilient agile regulatory systems are still insufficient, restricting the establishment of systematic, implementable, and sustainable long-term governance mechanisms for GenAI application in higher education.

5 Conclusion and Prospects

5.1 Summary of Findings

From the dual perspectives of project management and humanistic ethical governance, this study systematically collates and conducts a thematic analysis of the existing literature on the application of generative AI (GenAI) in higher education. The core findings are summarized into three dimensions, and the major deficiencies in current research are identified accordingly.

First, in the realm of teaching applications, existing studies have comprehensively explored GenAI - empowered teaching innovation, personalized learning, intelligent systems, foreign - language writing feedback, and digital textbook development. GenAI is demonstrated to drive teaching from instrumental assistance to ecological restructuring, including the dynamic balance in personalized learning, a four - agent “teacher–AI–student–textbook” interaction network, and CoT - based teaching agents for higher - order thinking. Some studies also examine the structural impacts on schooling and learning evaluation. Nevertheless, most research remains confined to instrumental and model innovation, lacking objective control and whole - process project management logic. Insufficient consideration is given to resource allocation, efficiency, cost - effectiveness, and fundamental educational structural changes.

Second, with regard to subject influences, academic research focuses on the complex effects of GenAI on teachers' professional ecosystems, disparities in undergraduate AI literacy, ideological and political education, and educational research paradigms. Digital intelligence enablement presents a tension: while it promotes teaching and research innovation, it also increases teachers' workload and occupational pressure. Meanwhile, the pronounced digital divides in AI literacy exacerbate educational inequity, particularly for low - income students. Most analyses concentrate on individual behaviors, lacking systematic humanistic governance and organizational planning, with inadequate ethical support and limited reference to international GenAI education practices.

Third, concerning governance challenges, a wealth of findings cover AIGC detection, academic integrity, ethical norms, data security, copyright, smart library risks, and international institutional responses, clarifying ethical dilemmas and preliminary governance pathways. With technological iteration, new models such as DeepSeek exacerbate the risks of factual deviation and hallucination. Academic integrity governance is transitioning from rigid detection to empowerment - oriented evaluation. However, few studies establish an integrated framework that combines project - management - based risk control and closed - loop governance with humanistic ethical supervision, resulting in fragmented countermeasures and insufficient long - term and systematic governance discussions.

Finally, this study objectively recognizes the limitations in literature sources and sample coverage. It primarily retrieves CNKI literature concentrating on GenAI practices in Chinese higher education. Nevertheless, GenAI in education is a highly international domain. In comparison with large - scale bibliometric studies based on the Web of Science that encompass hundreds of core papers. — for example, previous quantitative analyses of 581 WOS core documents^[3] — This study exhibits deficiencies in cross - cultural comparison, drawing on experiences from world - class universities, and integrating global empirical data. Future research will extend to international databases such as Web of Science and Scopus to conduct large - sample cross - cultural reviews and meta - analyses, offering comprehensive global references for the governance of Generative Artificial Intelligence (GenAI) in Chinese universities.

5.2 An Integrated Governance Framework and Future Prospects

Against the trend of higher education digital transformation and widespread GenAI

penetration, future research should rely on project management theories, strengthen humanistic ethical value guidance, promote interdisciplinary integration, and build on existing findings.

In response to the deficiency of whole - process coordination and systematic ethical constraints in the existing literature, this research constructs an integrated "technology empowerment - project control - ethical governance" trilateral framework for the implementation of generative artificial intelligence (GenAI) in universities (see Figure 5). This construction is based on the three core themes of teaching application, disciplinary influence, and governance challenges. This framework integrates large - scale engineering project management paradigms and humanistic ethical baselines into university teaching, learning, and administrative processes, thereby guaranteeing the safe, controllable, high - quality, and efficient deployment of technology. As Peter Drucker pointed out, "The essence of management is not control, but empowerment and coordination, which guides every practice towards common goals." This statement provides guidance for the standardized application of GenAI in higher education, leading it from a state of disorder to order, and aligning technological advancement with the essence of education and humanistic values.

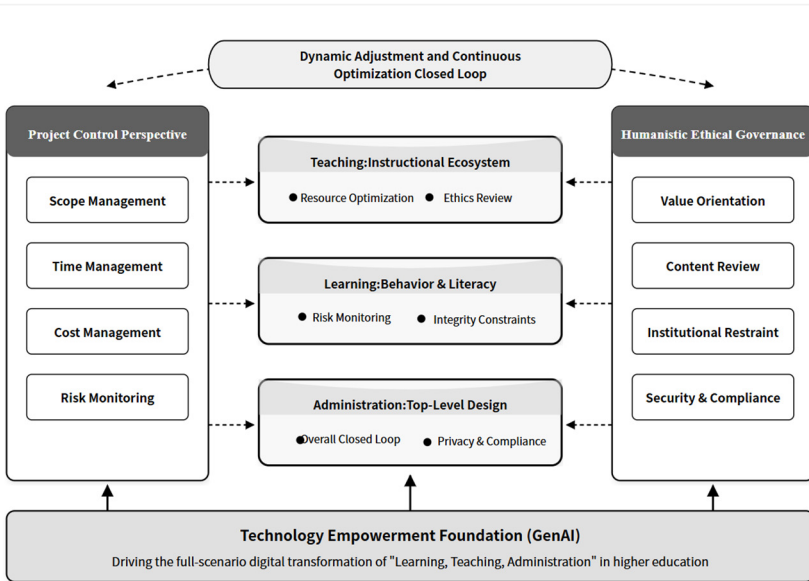


Fig. 5. The integrated governance framework of GenAI in higher education

Firstly, in the realm of teaching, it is imperative to enhance full - cycle resource coordination and ethical review. Future instructional practices involving Generative Artificial Intelligence (GenAI) should transition from fragmented instrumental support to systematic engineering deployment. From the perspective of project control, theories of scope and time management can be employed to schedule the integration of GenAI into curriculum design, classroom instruction, and teaching evaluation. Cost control

strategies can optimize the allocation of resources and the input - output efficiency of computing platforms and intelligent textbooks. Ethically, rigorous review mechanisms for teaching content must be established to prevent factual errors and value biases generated by AI, thereby safeguarding the dominant role of teachers in human - AI collaborative instruction.

Secondly, in the realm of learning: Implement dynamic risk surveillance and standardized academic constraints. The AI literacy and norms of students directly influence educational quality. From the perspective of project control, students' learning can be regarded as a sub - project under dynamic surveillance. Risk management can be employed to assess cognitive deterioration and thinking inertia resulting from excessive technological reliance. Ethically, clear boundaries for AI usage and red lines for academic integrity should be delineated. Integrated AIGC detection and academic regulations should guide the rational utilization of generative AI for personalized learning while maintaining academic integrity.

Thirdly, in the domain of administration: Develop a systematic top - level design and solid data security foundations. In terms of project control, administrators can implement large - scale cluster engineering objective control to construct a closed - loop management mechanism (including planning, implementation, monitoring, and correction), eliminating cross - departmental barriers to achieve unified supervision of the procurement, deployment, and operation of the campus AI platform. From an ethical perspective, data security and copyright protection are of core importance; universities should formulate institutional protocols for data desensitization, privacy conservation, and copyright compliance, drawing on international practices to establish a dual safeguard of technical auditing and institutional standards.

Overall, this trilateral framework addresses existing fragmented governance deficiencies and provides practical guidelines for aligning technological innovation with higher education's intrinsic nature. Further research should conduct localized empirical exploration tailored to Chinese higher education contexts.

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