A Study on the Application of Artificial Intelligence in Supporting University Lecturers' Lecture Preparation

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Abstract
In the context of accelerating digital transformation across higher education institutions worldwide, generative artificial intelligence tools are increasingly adopted by university lecturers in lecture preparation, creating an urgent need for an integrative theoretical framework to explain this process of application. This study aims to clarify the functional categories through which artificial intelligence is applied in lecture preparation, to identify the factors governing the extent to which this technology is accepted and effectively used, and to assess the accompanying opportunities and challenges. To achieve these objectives, the study adopts a desk research method, collecting and comparatively analyzing academic works published from 2015 onward, drawing on the Technology Acceptance Model, the Unified Theory of Acceptance and Use of Technology, and the Technological Pedagogical Content Knowledge framework as its theoretical foundation. The findings show that artificial intelligence is applied through five principal functional categories, among which content and outline generation is the most prevalent; the degree of technology acceptance is jointly shaped by technological perception, institutional conditions, and pedagogical competence; and opportunities for efficiency and personalization consistently coexist with challenges relating to content quality and academic integrity. On this basis, the study proposes an integrative conceptual framework combining the three theories above, contributing a theoretical foundation for subsequent empirical research and offering governance implications for lecturers, higher education institutions, and education management authorities.

Keywords: *Generative artificial intelligence; University lecture preparation; Technology acceptance model; Technological pedagogical content knowledge.*

1. Introduction

Digital transformation is reshaping higher education activity worldwide, within which generative artificial intelligence - artificial intelligence capable of creating new content rather than merely analyzing existing data - has become a driving force transforming teaching practice. According to the global survey conducted by the Digital Education Council (2025), 61 percent of faculty members had already used artificial intelligence in teaching, although 88 percent of them described their use as only moderate. On the learner side, the Digital Education Council (2024) recorded that 86 percent of students across sixteen countries had used artificial intelligence in their studies.

Against this backdrop, lecture preparation - the design of content, assignments, learning materials, and instructional methods - faces a dual pressure from an ever-increasing workload and the demand for personalization and improved training quality in line with international accreditation standards, making generative artificial intelligence an increasingly anticipated solution.

A synthesis of the international literature reveals three parallel yet insufficiently connected research streams. The first stream explains the extent to which lecturers accept artificial intelligence through the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT). Shata and Hartley (2025), surveying 294 faculty members, and Sevilla-Bernardo et al. (2025), surveying 71 faculty members, both confirm that perceived usefulness is the strongest predictor of usage intention - a clear point of convergence. However, data from the Digital Education Council (2025) show that 40 percent of faculty members rate themselves as still at a beginner stage of digital competence, revealing a gap between a positive attitude of acceptance and cautious actual usage behavior - a gap that existing technology acceptance models have not yet adequately explained.

The second stream examines the specific applications of artificial intelligence in designing learning materials, constructing assessments, and personalizing instructional content. Black and Betts (2025) found that 89 percent of surveyed faculty members had used generative artificial intelligence for lecture preparation tasks, with lesson planning being the most common task - evidence that this is the most active area of practical application. However, most studies to date have merely described usage frequency without analyzing the mechanism through which this use affects the quality of lecture preparation outputs. On the pedagogical theory side, Mishra et al. (2023) argue that generative artificial intelligence possesses generativity and human-like interactivity, requiring an expansion of the Technological Pedagogical Content Knowledge (TPACK) framework. This is an important point of convergence, yet this expanded framework is rarely tested together with the technology acceptance models of the first stream.

The third stream warns of risks to academic integrity, excessive technological dependence, and the quality of content produced by generative artificial intelligence. Michel-Villarreal et al. (2023) point out that integrating this technology into academic settings raises concerns about content accuracy and the risk of diminished critical thinking if misused. The point of contention lies in who bears the risk: most studies focus on learners, while similar risks on the lecturer side - the party who directly determines the quality and originality of learning materials when using artificial intelligence for lecture preparation - have not received commensurate analytical attention.

Taken together, the three research streams reveal a clear gap: no systematic study has yet placed the role of artificial intelligence in supporting lecture preparation at the center of analysis while simultaneously connecting technology acceptance theory with modern pedagogical theory. The absence of such an integrative analytical framework leaves higher education institutions without an adequate basis for formulating policies to build lecturers' digital competence, as evidenced by the finding that only 6 percent of faculty members in the Digital Education Council (2025) survey fully agreed that their institution had provided sufficient resources to develop skills in using artificial intelligence - a gap of urgent practical and governance significance that extends well beyond the academic domain alone.

On the basis of the gap identified above, this paper pursues the overall objective of systematically synthesizing, analyzing, and evaluating the role of artificial intelligence in supporting lecture preparation for university lecturers, combining technology acceptance theory with modern pedagogical theory. Building on this, the study answers three specific questions in the findings

section: which functional categories artificial intelligence is currently being applied to in lecture preparation; which theoretical factors govern the extent to which lecturers accept and effectively use this technology; and which opportunities and challenges must be considered for this application to proceed effectively and responsibly.

2. Theoretical Foundation and Research Methodology

2.1. Theoretical Foundation

The paper's analytical framework is built on three foundational theories, selected to jointly explain two closely linked dimensions of the phenomenon under study: the extent to which lecturers accept the use of artificial intelligence, and the pedagogical competence required to exploit this technology effectively in lecture preparation.

The Technology Acceptance Model (TAM), proposed by Davis (1989), identifies perceived usefulness and perceived ease of use as the two central constructs governing the intention to use technology. The finding reported in Section 1 of this paper - that perceived usefulness is the strongest predictor of lecturers' intention to use artificial intelligence (Shata & Hartley, 2025; Sevilla-Bernardo et al., 2025) - confirms the relevance of this model to the context of the present study. The Unified Theory of Acceptance and Use of Technology (UTAUT), developed by Venkatesh et al. (2003), extends the Technology Acceptance Model by adding two constructs - facilitating conditions and social influence - thereby explaining the role of the institutional environment and peer networks in technology-use decisions. A recent study by Liang and Suwanragsa (2025), covering 500 university lecturers in Thailand, confirms that social influence is the strongest predictor of the intention to use generative artificial intelligence, showing that the Unified Theory of Acceptance and Use of Technology effectively compensates for the limitations of the original Technology Acceptance Model when applied to the context of new technology.

However, both theories above explain only whether lecturers use artificial intelligence, not whether that use translates into improved quality of lecture preparation. This gap is addressed by the Technological Pedagogical Content Knowledge (TPACK) framework of Koehler and Mishra (2009), which identifies effective pedagogical competence as the intersection of technological knowledge, pedagogical knowledge, and content knowledge. Mishra et al. (2023) argue that this framework needs to be expanded when applied to generative artificial intelligence, since this technology exhibits generativity and human-like interactivity - two characteristics absent from earlier digital technologies. Combining these three theories simultaneously forms a two-tier analytical framework: the Technology Acceptance Model and the Unified Theory of Acceptance and Use of Technology explain the acceptance tier - whether and to what extent lecturers use artificial intelligence; the Technological Pedagogical Content Knowledge framework explains the competence tier - whether that use is translated into improved lecture preparation quality. This is precisely the integrative theoretical framework found to be missing from the existing research streams identified in Section 1.

2.2. Research Methodology

This paper adopts a desk research method, based on the principle that a literature review constitutes an independent research methodology with a clear procedure rather than merely a preparatory step (Snyder, 2019). Sources were selected according to three criteria: publication from 2015 onward - with the exception of the original theoretical works cited in Section 2.1, retained to preserve the originality of the theoretical framework; peer-reviewed status; and publication in journals with

internationally recognized indexing such as Scopus or Web of Science. The search was conducted across the academic databases Scopus, Web of Science, ERIC, and Google Scholar, using keyword combinations such as "generative artificial intelligence" paired with "lecture preparation," "instructional design," or "course design," together with "faculty acceptance" paired with "TAM" or "UTAUT." The screening process followed three steps - identification, screening by title and abstract, and full-text assessment - drawing inspiration from the transparency principle of the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) reporting framework (Page et al., 2021), although the paper does not fully comply with the procedure of a formal systematic review. A comparative analysis method was applied to reconcile findings across studies belonging to the three research streams identified in Section 1, from which the integrative analytical framework was synthesized. The principal limitation of this method is the absence of primary data collected from lecturers in Vietnam, meaning the findings are more theoretical syntheses than direct empirical verification.

3. Synthesized Findings and Discussion

3.1. Classification of Artificial Intelligence Applications in Supporting Lecture Preparation

Drawing on the comprehensive classification study of Samala et al. (2025) - built on a review of 453 scientific works, including the 50 most-cited works of 2023 - combined with the stage-based classification framework for generative artificial intelligence applications in lesson design proposed by Moundridou et al. (2024), applications of artificial intelligence in supporting lecture preparation are synthesized into five principal functional categories, presented in Table 1.

Table 1. Classification of artificial intelligence applications by lecture-preparation support function

Functional category	Description of activity	Illustrative tools	Empirical evidence
Generation of lecture content and outlines	Drafting outlines, learning objectives, and content structures based on text prompts	ChatGPT, Claude, Gemini	89% of surveyed faculty used it for lesson planning (Black & Betts, 2025)
Design of inquiry-based learning activities	Building activities and guiding questions suited to each stage of inquiry-based learning	AI assistants integrated into inquiry-based instructional workflows	Moundridou et al. (2024)
Construction of assessments and feedback	Drafting multiple-choice and essay questions, grading rubrics, and automated feedback	AI tools specialized for assessment	Samala et al. (2025)

Functional category	Description of activity	Illustrative tools	Empirical evidence
Compilation of multimedia learning materials	Designing slide presentations, visual diagrams, and illustrative images for lectures	Generative AI tools for image and presentation creation	Samala et al. (2025)
Personalization of content to learner ability	Adjusting difficulty level and language to suit different learner groups	AI-integrated adaptive learning platforms	Michel-Villarreal et al. (2023)

Source: Compiled by the author.

3.2. Analysis through the Established Theoretical Framework

Comparing the five functional categories above with the integrative theoretical framework established in Section 2 reveals a clear pattern: the prevalence of each functional category is proportional to the degree of immediate perceived usefulness that lecturers attribute to that application. The content-and-outline-generation category - the category with the highest usage rate according to Black and Betts (2025) - is also the category delivering the clearest time-saving benefit, consistent with the perceived-usefulness construct of the Technology Acceptance Model. Conversely, the category of personalizing content to learner ability - which requires lecturers to invest time in initial setup and to possess in-depth understanding of learner characteristics - shows a markedly lower application rate across the studies synthesized, which accurately reflects the prediction of the Unified Theory of Acceptance and Use of Technology that facilitating conditions related to time and resources govern actual usage behavior.

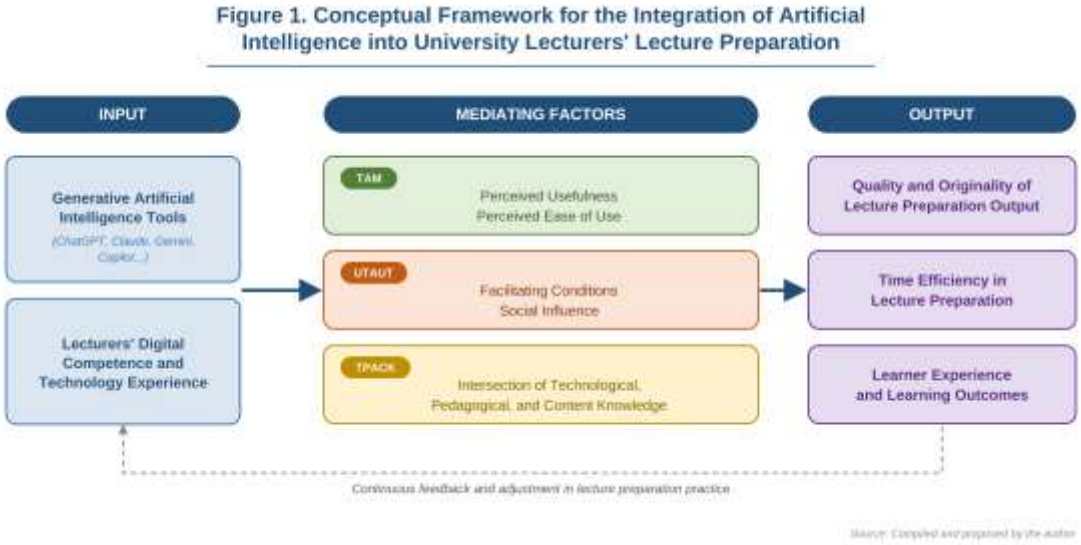
Viewed through the Technological Pedagogical Content Knowledge framework, the difference among functional categories lies not only in frequency of use but also in the degree of pedagogical competence required. The categories of assessment construction and inquiry-based learning-activity design require lecturers to possess solid pedagogical knowledge in order to evaluate and refine artificial-intelligence-generated outputs before use, consistent with the warning of Mishra et al. (2023) that the generative nature of this technology produces outputs that are unstable across repeated queries and therefore cannot be used directly without professional review. This is precisely the point that studies in the specific-application stream - which tend to focus on describing usage frequency - have not yet clarified, and is the gap that this paper's integrative analytical framework aims to fill.

3.3. Illustrative Conceptual Framework

Figure 1 visualizes the pattern described above as a unified conceptual framework. Generative artificial intelligence tools and lecturers' existing digital competence serve as inputs; three theoretical constructs - perceived usefulness and perceived ease of use from the Technology Acceptance Model, facilitating conditions and social influence from the Unified Theory of Acceptance and Use of Technology, and the intersection of the three knowledge domains in the Technological Pedagogical Content Knowledge framework - serve as mediating factors determining whether use is translated into improved lecture-preparation quality; and output quality, time efficiency, and learner experience constitute the outputs. The feedback arrow at the

bottom of the figure represents the iterative nature of the process: practical outcomes feed back into lecturers' digital competence and experience over successive lecture-preparation cycles.

Figure 1. Conceptual framework for the integration of artificial intelligence into university lecturers' lecture preparation



Source: Compiled and proposed by the author.

3.4. Comparison of Opportunities and Challenges

Alongside the opportunities noted above, applying artificial intelligence to lecture preparation also raises a number of challenges that warrant consideration, summarized comparatively in Table 2.

Table 2. Comparison of opportunities and challenges for university lecturers applying artificial intelligence to lecture preparation

Dimension	Opportunities	Challenges and risks
Efficiency and time	Substantially shortens the time needed to draft outlines and initial learning materials (Black & Betts, 2025)	Time saved may be offset by the additional effort required for verification and correction, given unstable accuracy (Michel-Villarreal et al., 2023)
Content quality	Offers diverse suggestions for approaches and lecture structure	Risk of inaccurate subject-matter content and inconsistency across repeated queries (Mishra et al., 2023)
Personalization	Supports content adjustment for multiple learner groups	Requires investment of time in setup and in collecting learner data

Dimension	Opportunities	Challenges and risks
Lecturer competence and readiness	Social influence and peer encouragement promote use (Liang & Suwanragsa, 2025)	40% of faculty members rate themselves as still at a beginner stage of digital competence (Digital Education Council, 2025)
Institutional support	Facilitating conditions such as infrastructure and training promote effective use (Venkatesh et al., 2003; Liang & Suwanragsa, 2025)	Only 6% of faculty members fully agree that their institution has provided sufficient resources to develop this competence (Digital Education Council, 2025)
Academic integrity and ethics	Can increase transparency in lecture preparation where clear regulations exist	Perceived risk reduces usage intention (Liang & Suwanragsa, 2025); concerns over the originality of learning materials (Michel-Villarreal et al., 2023)

Source: Compiled by the author.

3.5. Discussion: Comparing International Experience

A comparison across different geographic contexts reveals notable differences in the mechanisms governing usage behavior. In the United States, perceived usefulness plays the dominant role according to the study by Shata and Hartley (2025) of 294 faculty members; whereas in Thailand, Liang and Suwanragsa (2025) find that social influence is in fact the strongest predictor, surpassing perceived usefulness. This difference reflects the collectivist cultural characteristics common in Southeast Asia, where lecturers' technology-use decisions are strongly shaped by peer norms and practices rather than by purely individual assessments of effectiveness - a finding with important implications for the context of Vietnamese higher education, which shares many similar organizational-culture characteristics with Thailand.

The implication drawn is that strategies to promote the application of artificial intelligence in lecture preparation at Vietnamese higher education institutions should prioritize building networks of pioneering lecturers and communities of practice for sharing usage experience, rather than focusing solely on communicating the technology's usefulness - an approach better suited to Western contexts. At the same time, the finding that only 6 percent of faculty members worldwide fully agree that their institution has provided sufficient resources to develop digital competence (Digital Education Council, 2025) indicates that investment in facilitating conditions - infrastructure, training, and guidelines for responsible use - is a policy lever with consistent impact across diverse geographic contexts.

4. Conclusions, Policy Implications, and Future Research Directions

4.1. Conclusions

Synthesizing the classification framework of Samala et al. (2025) together with the empirical studies analyzed in Section 3 makes it possible to answer the three research questions posed at the outset. First, artificial intelligence is currently applied in lecture preparation through five

functional categories, among which content and outline generation is the most prevalent. Second, the degree of acceptance and effective use is jointly governed by three theories: perceived usefulness and perceived ease of use from the Technology Acceptance Model, facilitating conditions and social influence from the Unified Theory of Acceptance and Use of Technology, and the intersection of three knowledge domains in the Technological Pedagogical Content Knowledge framework - these three theoretical layers are unified in the conceptual framework presented in Figure 1. Third, opportunities relating to efficiency and personalization consistently coexist with challenges relating to content quality, digital competence, and academic integrity, calling for a balanced approach rather than one-sided encouragement of use.

4.2. Policy and Governance Implications

For lecturers: artificial-intelligence-generated outputs should be treated as drafts rather than final products. All subject-matter content must be verified before being incorporated into a lecture. For higher education institutions: priority should be given to building communities of practice and networks of pioneering lecturers who share usage experience, rather than relying solely on one-off training sessions - an approach consistent with the prominent role of social influence identified in Section 3.5. Technical infrastructure and responsible-use regulations should be issued together, not separately. For education management authorities: official guidance on disclosing the extent of artificial intelligence use in teaching activities should be issued promptly, creating a clear legal framework for lecturers.

4.3. Limitations and Future Research Directions

The principal limitation of this paper is its reliance on a desk research method without the collection of primary data from lecturers in Vietnam, meaning the conceptual framework presented in Figure 1 remains, at this stage, a theoretical proposition. Future research should empirically test this framework through a quantitative survey of university lecturers in Vietnam, using structural equation modeling to confirm the mediating role of the three theoretical constructs proposed, while also comparing results across different disciplinary groups.

References

Black, E., & Betts, K. (2025). Unlocking the future: How are EdD faculty using generative AI in doctoral research? Impacting Education: Journal on Transforming Professional Practice, 10(1), 49–56. https://doi.org/10.5195/ie.2025.475

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319–340. https://doi.org/10.2307/249008

Digital Education Council. (2024). What students want: Key results from DEC Global AI Student Survey 2024. https://www.digitaleducationcouncil.com/post/what-students-want-key-results-from-dec-global-ai-student-survey-2024

Digital Education Council. (2025). Global AI Faculty Survey 2025. https://www.digitaleducationcouncil.com/post/digital-education-council-global-ai-faculty-survey

Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge? Contemporary Issues in Technology and Teacher Education, 9(1), 60–70. https://citejournal.org/volume-9/issue-1-09/general/what-is-technological-pedagogicalcontent-knowledge

Liang, D., & Suwanragsa, I. (2025). Determinants of generative AI adoption in higher education: A social science perspective on Thai faculty behavioral intentions. European Journal of Social Science Education and Research, 12(4), 132–147. https://doi.org/10.26417/bamx9m98

Michel-Villarreal, R., Vilalta-Perdomo, E., Salinas-Navarro, D. E., Thierry-Aguilera, R., & Gerardou, F. S. (2023). Challenges and opportunities of generative AI for higher education as explained by ChatGPT. Education Sciences, 13(9), Article 856. https://doi.org/10.3390/educsci13090856

Mishra, P., Warr, M., & Islam, R. (2023). TPACK in the age of ChatGPT and generative AI. Journal of Digital Learning in Teacher Education, 39(4), 235–251. https://doi.org/10.1080/21532974.2023.2247480

Moundridou, M., Matzakos, N., & Doukakis, S. (2024). Generative AI tools as educators' assistants: Designing and implementing inquiry-based lesson plans. Computers and Education: Artificial Intelligence, 7, Article 100277. https://doi.org/10.1016/j.caeai.2024.100277

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., … Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. BMJ, 372, Article n71. https://doi.org/10.1136/bmj.n71

Samala, A. D., Rawas, S., Wang, T., Reed, J. M., Kim, J., Howard, N.-J., & Ertz, M. (2025). Unveiling the landscape of generative artificial intelligence in education: A comprehensive taxonomy of applications, challenges, and future prospects. Education and Information Technologies, 30(3), 3239–3278. https://doi.org/10.1007/s10639-024-12936-0

Sevilla-Bernardo, J., Cervera, L., & Martin-Robles, J. (2025). Impact and opportunities of generative artificial intelligence in education: A study of academic perceptions. International Journal of Emerging Technologies in Learning (iJET), 20(3), 55–71. https://doi.org/10.3991/ijet.v20i03.55809

Shata, A., & Hartley, K. (2025). Artificial intelligence and communication technologies in academia: Faculty perceptions and the adoption of generative AI. International Journal of Educational Technology in Higher Education, 22, Article 14. https://doi.org/10.1186/s41239-025-00511-7

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. Journal of Business Research, 104, 333–339. https://doi.org/10.1016/j.jbusres.2019.07.039

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS Quarterly, 27(3), 425–478. https://doi.org/10.2307/30036540

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