

Review

The Intersection Between Moodle, Active Methodologies, and Artificial Intelligence in Higher Education: A Narrative Review and Thematic Analysis

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Abstract

Higher Education is facing a transformation of the teaching profession due to the confluence of active methodologies, learning management systems, and artificial intelligence. However, existing research tends to address these elements in isolation, lacking integrative analyses that examine their combined impact on the teaching role in higher education. Through a narrative review and thematic analysis of 49 articles, opportunities and challenges in this intersection are identified. The results indicate that the teacher is not merely a content transmitter but a designer of formative experiences, a critical guide, and an ethical reference in the use of AI. More than a replacement, technology proposes a teacher profile as an architect of critical and adaptive learning that combines pedagogy, technology, and ethics.

Keywords: Moodle; active methodology; artificial intelligence; teaching; higher education

1. Introduction

Higher education is immersed in a confluence of educational technology and pedagogy (techno-pedagogy) that challenges traditional teaching–learning paradigms and redefines the relationships among teachers, students, and educational institutions. At the heart of this transformation are three elements that, having developed independently, cannot be explained in isolation: active teaching methodologies, learning management systems (LMS) such as Moodle, and Artificial Intelligence (AI). The interaction of these three axes is shaping an ecosystem in which pedagogical roles are redefined, making the teaching profile more complex, critical, and strategic (Crisol-Moya et al., 2020; Harvard University, 2025).

Active methodologies such as Project-Based Learning (PBL), Challenge-Based Learning (CBL), Inverted Classroom (ICL), and gamification constitute the essence of the pedagogical change currently underway. They represent a transition from a unidirectional content transmission model to a participatory model that positions the student as the driving force of learning. Evidence indicates that this type of methodology contributes to the development of transversal skills such as autonomy, collaboration, problem-solving, and critical thinking. These skills are relevant to both the workplace and society in contemporary contexts (Haughton, 2019; McLain et al., 2023; Vázquez et al., 2020; Villamar & Sánchez, 2024; Duran et al., 2025). However, the effective implementation of these methodologies requires not only teachers' pedagogical involvement but also adequate



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support structures and technological integration to foster meaningful learning experiences (Adhikar & Pandey, 2025).

In this context, Moodle and other LMS platforms constitute the foundational infrastructure for the implementation of active methodologies. Based on an open, socioconstructivist philosophy, Moodle functions as a space for course administration and the development of academic environments for interaction and collaboration (Purdue University, 2024; Shirshikov, 2025). Its relevance lies in the fact that LMSs serve as environments where active methodologies are operationalized through tools such as discussion forums, wikis, adaptive questionnaires, and resource repositories that complement face-to-face teaching. The flexibility of learning management systems enables the articulation of hybrid and blended learning and, above all, fosters more inclusive and participatory educational environments (D. Singh, 2022; Xu & Mahenthiran, 2016). In this regard, recent research indicates that the true value of LMS platforms emerges when they are integrated with other transformative technologies (Fernández-Olaskoaga et al., 2023).

Unlike closed or proprietary learning management environments, Moodle was conceived under a socioconstructivist pedagogical framework and an open-source architecture that promotes active participation, collaboration, and faculty autonomy in the design of learning experiences (Shirshikov, 2025; Kaleci, 2025). In the context of artificial intelligence, this open architecture enables the integration of more flexible and transparent AI solutions, facilitating rigorous ethical control over data usage and automation processes. These aspects are increasingly critical for technological sovereignty and for reinforcing the pedagogical agency of teachers in contemporary higher education (Tresipunt, 2025; Xu & Mahenthiran, 2016).

As a result, the literature reveals a lack of integrative analyses capable of explaining how the combined interaction of active methodologies, LMS Moodle, and artificial intelligence jointly reshapes the teaching role in higher education. Artificial intelligence not only enhances the capabilities of LMS platforms but also transforms pedagogical logic by introducing mass customization, predictive analytics, and immediate feedback (Kumar et al., 2025; Li & Gao, 2025; Vieriu & Petrea, 2025). In current higher education contexts, the application of artificial intelligence is increasingly evidenced through chatbots that support academic tutoring, intelligent systems that enable personalized learning pathways, and learning analytics tools designed to identify students at risk of academic dropout (Dixon et al., 2025; R. Singh, 2023; Haroud, 2025). These advances are driven by the need to accommodate diversity in learning styles and to optimize institutional resources; however, they also raise ethical dilemmas related to algorithmic bias, data privacy, and the potential uncritical dependence of students on automated systems (Arise et al., 2024; Sejdiu & Sejdiu, 2025).

The intersection between active methodologies, LMS platforms such as Moodle, and artificial intelligence is therefore inevitable and transformative. Active methodologies require digital platforms to be scalable; Moodle provides this structural base but reaches its greatest potential when integrated with AI. In turn, artificial intelligence finds in Moodle and active methodologies the context in which its application can be most pedagogically meaningful (Usher, 2025). This synergy not only enables new forms of teaching but also necessitates a redefinition of the teacher's role (Caballero et al., 2025; Phillips, 2025). Evidence from prior research suggests that this transition entails significant obstacles, including psychological and attitudinal resistance to technology adoption (AL-Takhayneh et al., 2022); however, such resistance is unlikely to halt its progression within higher education.

Artificial intelligence, as a third dimension, represents a significant disruption that has already become an applied reality in higher education. AI applications in this context can be grouped into three main areas: adaptive personalization, learning analytics, and process

automation. Personalization through recommender systems and intelligent tutoring has been shown to improve student performance, retention, and engagement (Merino-Campos, 2025). Real-time learning analytics enables the early identification of students at risk of dropout and the implementation of timely interventions (Dixon et al., 2025). Additionally, the automation of feedback and assessment through chatbots and intelligent systems frees teachers' time for higher-value pedagogical tasks (R. Singh, 2023; Deckker & Sumanasekara, 2025). Nevertheless, AI applications pose significant ethical challenges that require robust regulatory frameworks to ensure responsible and transparent use (Prada & Beltrán, 2024; Wang et al., 2025).

Technologies and Pedagogical Models: Progressive Improvements to Shulman's Proposal

The Technological Pedagogical Content Knowledge (TPACK) framework, originally formulated by Shulman between 1986 and 1987, emphasizes the integration of disciplinary content knowledge with pedagogical strategies. It was not until 2006 that Mishra and Koehler incorporated technology as a third essential knowledge domain. However, this model does not fully capture the transformative and autonomous nature of generative artificial intelligence, as TPACK conceptualizes technology primarily as a tool controlled by the teacher (Prada & Beltrán, 2024; Mimoudi & Mokhtari, 2025).

In response to these emerging realities, theoretical extensions such as the Intelligent-TPACK (AI-TPACK) model have been proposed. This framework incorporates ethical knowledge and AI-specific competencies as new and necessary dimensions of teaching expertise (Mimoudi & Mokhtari, 2025). More recent models, including AIA-PCEK (Artificial Intelligence Agent–Pedagogical Content Ethical Knowledge), advance this perspective by conceptualizing artificial intelligence not merely as an enhanced instructional tool but as a semi-autonomous pedagogical agent. In this model, ethical knowledge and critical thinking are positioned at the core of contemporary teaching practice (Mimoudi & Mokhtari, 2025; Wang et al., 2025). Within this theoretical evolution, the teacher's role remains irreplaceable. The effectiveness of the intersection among LMS Moodle, active methodologies, and artificial intelligence does not depend solely on the availability of platforms or algorithms, but on the teacher's capacity to pedagogically articulate these resources, contextualize their use, and anticipate potential risks.

Despite the growing body of research on active methodologies, learning management systems, and artificial intelligence in higher education, the existing literature continues to examine these dimensions either independently or through partial pairings. Many studies address pedagogical innovation without considering the technological infrastructure that supports it, analyze LMS platforms without embedding them in active pedagogical models, or explore artificial intelligence primarily from technical or ethical perspectives without situating it within concrete teaching practices. Consequently, there remains a lack of integrative analyses capable of explaining how the combined interaction of active methodologies, LMS Moodle, and artificial intelligence jointly reshapes the teaching role in higher education. In this context, the objective of this research is to critically analyze, through a narrative literature review, how the teaching role in higher education is transformed in response to the challenges and opportunities arising from the triple intersection of LMS Moodle, active methodologies, and artificial intelligence.

2. Materials and Methods

A qualitative approach is adopted through a narrative review of the academic literature, which is appropriate for synthesizing and interpreting a broad, rapidly changing body of work and for developing a critical argument about a complex phenomenon (Hernández et al., 2014). This approach is considered suitable to apprehend, systematize, and inter-

pret a large and continuously evolving documentary corpus, allowing the synthesis of a critical and integrative perspective on the phenomenon under study. Unlike systematic reviews—typically oriented toward answering specific questions through exhaustive and primarily statistical collection and evaluation procedures—narrative reviews emphasize integrative and interpretative construction and the coherence of arguments (Arias, 2012; Ferrari, 2015). Although interpretative synthesis entails a degree of subjectivity, this limitation is mitigated through strict adherence to a structured search protocol and a systematic thematic analysis, aligned with qualitative rigor criteria such as credibility and dependability (Hernández et al., 2014; Sandelowski & Barroso, 2007).

To ensure rigor and transparency, the structured search guidelines developed by Templier and Paré (2015) are followed. Searches are conducted in high-impact databases (Scopus and Web of Science) and complemented with education-focused repositories (ERIC and Google Scholar) (Mosquera Ayala, 2018). Google Scholar is used exclusively as a complementary source to identify recent or in-press studies and relevant documents not yet indexed in Scopus or Web of Science. It is not employed as a primary database, and all records retrieved through Google Scholar are subsequently verified against peer-reviewed publication standards.

Boolean operators and search equations were applied using combinations of key terms in English and Spanish. The search process was designed to be conceptually inclusive and iterative; while the final string was (teach* role OR faculty role) AND (Moodle OR “learning management system”) AND (“active methodologies” OR “active learning”) AND (“artificial intelligence” OR “generative AI” OR “AI ethics”), wildcards (truncation) and bilingual equivalents (e.g., ‘rol docente’) were employed during the exploratory and screening phases. This strategy ensured that variations such as ‘teacher role,’ ‘teachers’ perspectives,’ and ‘teaching role’ were fully captured in the initial 118 records, maintaining the integrity and comprehensiveness of the final selection ($n = 49$).

The initial search yields 118 potential papers, consisting primarily of peer-reviewed journal articles. Subsequently, explicit inclusion and exclusion criteria are applied. Inclusion criteria are: (a) peer-reviewed journal articles and theoretically grounded book chapters; (b) a focus on higher education; (c) explicit analysis of at least one of the three core components of the study (LMS Moodle, active methodologies, or artificial intelligence); and (d) publication between 2016 and 2025, in order to capture recent developments in LMS evolution and the rapid emergence of generative AI in higher education. Exclusion criteria include: (a) studies focused on primary or secondary education; (b) purely technical AI studies without pedagogical implications; (c) opinion pieces lacking analytical grounding; and (d) duplicated records across databases. The guiding research question is: How is the teaching role transformed in higher education in light of the challenges and opportunities posed by the triple intersection of LMS Moodle, active methodologies, and artificial intelligence?

After screening, a final corpus of 49 papers is obtained. Of these, 18 address a single component, 21 explore two interacting axes, and 10 focus directly on the triple convergence. This corpus size ensures an appropriate balance between analytical breadth and manageability, enabling the identification of patterns and contrasts while allowing for in-depth thematic analysis. The complete selection process and the specific reasons for document exclusion are detailed in Figure 1, following PRISMA 2009 guidelines (Moher et al., 2009).

The analysis followed the thematic synthesis technique proposed by Thomas and Harden (2008), structured into three sequential stages. In the first stage, line-by-line descriptive coding was performed to identify an initial pool of codes related to pedagogical practices and AI implementation. In the second stage, descriptive themes were developed by hierarchically grouping and comparing units of meaning; this process of constant

comparison allowed for the identification of recurring patterns and clusters—such as ‘Resistance to Change’ or ‘Content Curation’—closely linked to the original evidence. Finally, in the third stage, analytical themes were generated at a higher level of abstraction. Descriptive themes were synthesized into higher-order interpretive constructs—notably the ‘Architect of Critical and Adaptive Learning’—transcending individual findings to provide an integrative and explanatory framework for the transformation of the teaching role at the intersection of LMS Moodle, active methodologies, and artificial intelligence.

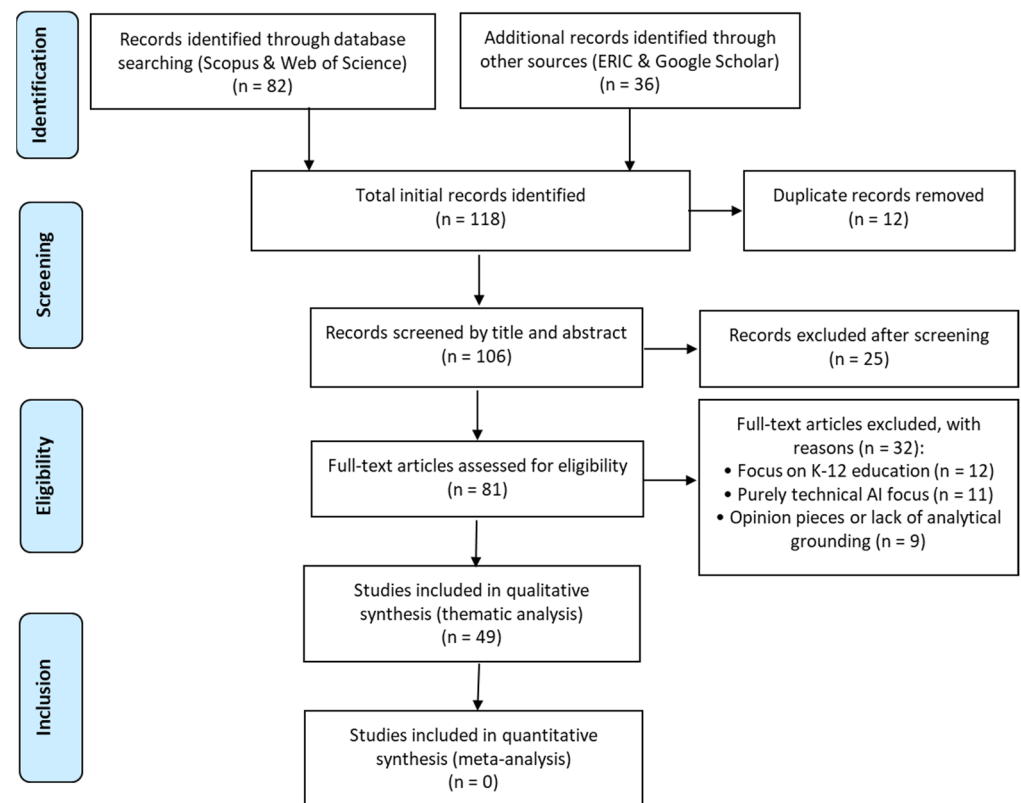


Figure 1. PRISMA flow diagram of the study selection process, including identification, screening, eligibility, and inclusion phases. *Note.* n = number of documents; AI = Artificial Intelligence. Adapted from Moher et al. (2009).

3. Results

In order to clearly present the findings, the results are organized into three main thematic axes derived from the thematic synthesis: (I) the pedagogical transformation of the teacher towards the design of active experiences; (II) the role of the teacher as curator and ethical supervisor in the use of artificial intelligence; and (III) the technological and institutional support sustaining the implementation of active methodologies and digital tools. Each thematic axis is structured into sub-themes (labeled A–C) that group the synthesized codes emerging from the analysis. This structure is intended to guide the reader through the results, moving from pedagogical transformations to ethical and institutional dimensions of the teaching role.

3.1. The Pedagogical Transformation of the Teacher Towards the Design of Active Experiences

The first theme addresses the pedagogical transformation of the teacher, moving from a transmitter of content to a designer of active learning experiences through active methodologies. This axis reflects a paradigmatic shift in the classroom, in which the emphasis moves from content delivery to the learning experience itself. In this context, the teacher ceases to function as a mere exhibitor of information and assumes the role

of designer of learning experiences, with direct implications for instructional design and pedagogical planning.

Within this first thematic axis, three interrelated sub-themes can be distinguished.

I.A. New teaching role: guide and mediator of learning.

The most recurrent pattern identified in the literature is the transition of the teacher from content exhibitor to guide and support (Tlalpachicatl et al., 2024). This mediating and facilitative role is essential for fostering active student participation (Pinenla et al., 2024) and requires the development of renewed professional competencies (Vásquez et al., 2020). Recent studies emphasize that teachers increasingly act as designers of learning scripts and mentors, guiding students toward greater responsibility for their own learning processes (McLain et al., 2023).

I.B. Opportunities in instructional and methodological design.

Active methodologies are widely recognized as effective alternatives for addressing classroom diversity and promoting student engagement (Pinenla et al., 2024). The effective integration of strategies such as the Inverted Classroom, Problem-Based Learning, Challenge-Based Learning, and gamification is associated with increased student autonomy and involvement (Pinenla et al., 2024). Recent evidence also indicates that the combination of approaches such as Just-in-Time Teaching, Peer Instruction, and artificial intelligence supports deeper understanding of abstract concepts (Acuña & Marrero, 2025).

At the same time, implementing active methodologies demands the development of advanced instructional competencies, as these approaches foster critical thinking, collaboration, problem-solving, research skills, and decision-making (Cabrera & González, 2025; Tapia et al., 2025). Their effectiveness depends on careful planning and well-structured instructional designs; otherwise, there is a risk of reducing active methodologies to superficial classroom dynamization (Pinenla et al., 2024).

I.C. Implementation challenges and resistance to change.

Despite their documented advantages, several obstacles continue to hinder the consolidation of active methodologies in higher education. These challenges include:

- The theoretical–practical gap: Although active methodologies are widely recognized, their implementation remains limited, partly due to insufficient teacher training (Cabrera & González, 2025).
- Workload: Complex active methodologies require a high level of commitment from both teachers and students, particularly in the preparation of materials and interactive activities (Carpena & Esteve, 2022; Tlalpachicatl et al., 2024).
- Resistance and devaluation: Institutional resistance persists, and some authors caution that framing the teacher primarily as a “facilitator” may lead to the devaluation of professional knowledge and pedagogical expertise (Phillips, 2025).

3.2. *The Role of the Teacher as Curator and Ethical Supervisor in the Use of Artificial Intelligence*

The second theme addresses the role of the teacher as a curator and ethical referent in the use of artificial intelligence. In this context, the teacher is understood as a critical evaluator, selector, and manager of content within the teaching–learning process. Artificial intelligence is thus conceptualized as a catalytic disruptor that expands pedagogical opportunities, while simultaneously requiring the integration of advanced critical and ethical competencies into teaching practice.

Within this second thematic axis, three interrelated sub-themes are identified.

II.A. Critical use and content curation of artificial intelligence.

Artificial intelligence reinforces the teaching function (Tresipunt, 2025) and supports the development of students' critical thinking skills (Acuña & Marrero, 2025). In particular, AI-mediated learning environments favor the verification and practice of analytical competencies. Students who use AI tools (e.g., ChatGPT, Gemini, Copilot) should be trained to question outputs, detect errors, and justify their reasoning, thereby promoting the development of metacognitive skills (Acuña & Marrero, 2025).

In addition, AI contributes to personalization and instructional effectiveness by adapting content to students' learning pace and automating administrative tasks. This functionality enables a more efficient use of teachers' time and professional effort (Tresipunt, 2025).

II.B. Ethical and regulatory challenges of artificial intelligence.

Despite its potential, the use of AI in higher education poses significant ethical and regulatory risks. The literature identifies several major concerns, including:

- Academic behavior: "AI-giarism," a neologism combining "AI" and "plagiarism," is identified as a growing threat to academic integrity in higher education (Chan, 2025).
- Lack of transparency: Increasing difficulty for students in distinguishing between human-generated and AI-generated texts raises concerns about authorship and accountability (Chan, 2025).
- Dependency and loss of control: Reliance on AI to solve academic tasks may limit students' self-regulation and increase risks related to plagiarism, algorithmic bias, and misuse of AI tools (Acuña & Marrero, 2025; Deckker & Sumanasekara, 2025).

II.C. Need for literacy and transparency.

In response to these challenges, the teacher assumes a regulatory and guiding role in the use of artificial intelligence (Chan, 2025). The literature highlights two key requirements for responsible integration:

- Clear instructional guidelines: The use of AI in collaborative and individual academic work must be regulated through explicit guidelines addressing prompt design, precision, clarity, and contextualization (Acuña & Marrero, 2025).
- Formative function: Ongoing teacher training in the ethical and pedagogical use of AI is essential to ensure its responsible and transparent integration into higher education (Merino-Campos, 2025)

3.3. The Technological and Institutional Support That Sustains the Implementation of Active Methodologies and Digital Tools

The third theme addresses technological support and institutional sustainability. This thematic axis examines the structural role of the learning management system (LMS) as a key enabler of educational innovation, as well as the institutional conditions required to ensure the sustainable implementation of active methodologies and digital tools in higher education.

Within this third thematic axis, three interrelated sub-themes are identified:

III.A. The LMS is an axis of interaction and analytics. The LMS functions as a space for collaboration and the management of the teaching load, that make possible:

- Activity support: Moodle proves to be effective in blended learning contexts, favoring interactivity and evidence management (Acuña & Marrero, 2025; Calás, 2022), as well as the automation of routine tasks;
- Streamlining the teaching process: Moodle provides instant feedback through automated questionnaires (D. Singh, 2022) and, with AI support, quickly evaluates

open-ended exercises (Tresipunt, 2025). This enables early identification and intervention for difficulties based on the detection of needs.

III.B. Competence demands and institutional training. The effectiveness of the LMS depends on the institution's training capacity and resources for its efficient use. This means, among others:

- Need for TPACK training: Teachers should receive training in the three knowledge areas established by the TPACK model (Cárdenas et al., 2023).
- Institutional support, technological infrastructure, and support from educational assistants are highly relevant across numerous courses (Acuña & Marrero, 2025; Caballero et al., 2025).

III.C. Infrastructure challenges and slow adoption. Technological and organizational obstacles persist, giving rise to:

- Technological barriers: Connectivity and resource availability remain significant constraints (Calás, 2022; Tlalpachicatl et al., 2024).
- Organizational resistance: Digital adoption advances more smoothly in environments with an institutional culture of innovation (AL-Takhayneh et al., 2022), whereas structural inertia slows AI integration (Vera, 2023).

The synthesized results of the thematic analysis, specifically the recurring patterns related to the transformation of the teaching role across pedagogical, ethical, and institutional dimensions, are presented in Table 1.

Table 1. Hierarchical Classification of Recurring Issues.

Main Topic	Subtopic	Qualitative Summary
I. Pedagogical Transformation: From the Transmitter to the Designer of Active Experiences	I.A. New Teaching Role: Guide and Mediator of Learning	Transition from exhibitor to guide and support. Role as mediator and facilitator of active participation. Balance of roles between “sage on the podium” (transmitter of knowledge) and “guide on the side” (facilitator). The teacher as creator of learning and designer of experiences.
	I.B. Instructional and Methodological Design Opportunities	Design of anti-IA tasks that promote higher order thinking, authenticity and process evaluation. Encouragement of autonomy, self-regulation and higher cognitive skills (analysis, synthesis, reflection). Use of scaffolding and careful planning of active methodologies.
	I.C. Challenges in Implementation and Resistance to Change	Gap between theory and practice and lack of systematization in the application of active methodologies. Student resistance to effort and preference for passive learning. Increased teaching workload due to the design of interactive materials and activities.
II. The Teacher as a Guidance and Ethical Supervisor of Artificial Intelligence (AI)	II.A. Critical Use and AI Content Curation	Teaching role of validation and critical curation of AI output to ensure accuracy and curricular relevance. Design of tasks that force evaluation and improvement of AI-generated solutions. Encouragement of critical thinking to judge the reliability of AI.
	II.B. Ethical and Regulatory Challenges of AI	Risk of plagiarism/AI-giarism and difficulty in differentiating human authorship. Student dependence on AI that limits self-regulation. Need to address ethical dilemmas (algorithmic bias, data privacy).
	II.C. Need for Literacy and Transparency	Teaching role to guide on recognition, citation and transparency in the use of AI tools. Need to develop Algorithmic Literacy as a key competence.

Table 1. *Cont.*

Main Topic	Subtopic	Qualitative Summary
III. Technological Support and Institutional Sustainability (LMS/Digital)	III.A. The LMS as an Interaction and Analytical Axis	LMS as a key platform to support active methodologies (forums, resources). Use of learning analytics and intelligent tutoring systems for early risk identification and timely intervention. Automation of routine tasks (assessment, tutoring) to free up teaching time.
	III.B. Institutional Training and Competency Demands	Need for continuous training in TPACK (Technical, Pedagogical and Content Knowledge). The effectiveness of the LMS depends directly on the instructor's knowledge and ability to use it (Teaching/LMS function). Institutional role to ensure support, infrastructure and clear policies for active methodologies and AI.
	III.C. Infrastructure and Slow Adoption Challenges	Deficit of infrastructure, connectivity and stability of the LMS (Moodle). Institutional inertia and resistance to change or slow adoption of AI. Inadequacy of conventional LMS tools for dynamic personalization (driving AI).

4. Discussion

The convergence of LMS Moodle, active methodologies, and artificial intelligence is radically transforming university education. On the one hand, LMSs such as Moodle create the technological infrastructure for communication and blended learning (Calás, 2022; Moodle, 2021). However, LMSs remain dependent on pedagogical mediation by teachers (Prada & Beltrán, 2024).

The findings of this study are consistent with previous research indicating that the teaching role in higher education is shifting from unidirectional content transmission toward functions of facilitation, mediation, and learning design in active and technology-enhanced environments (Caballero et al., 2025; Vásquez et al., 2020). In digital and AI-mediated contexts, faculty are increasingly characterized as critical mediators who curate, supervise, and contextualize information rather than acting as dominant information providers (Adhikar & Pandey, 2025; Buele & Llerena-Aguirre, 2025; Sejdiu & Sejdiu, 2025). Taken together, these studies support an understanding of contemporary teaching practice as the orchestration of learning processes—guiding, scaffolding, and moderating—rather than as mere content delivery (McLain et al., 2023; Tapalova & Zhiyenbayeva, 2022).

As a pedagogical counterbalance to unidirectional and technology-centered approaches, active methodologies are consolidated as the pedagogical axis that positions students as protagonists through projects, challenges, gamification, and the inverted classroom (Carpena & Esteve, 2022; Cabrera & González, 2025; Pinenla et al., 2024). Although the conception of the teacher as a designer and curator of learning experiences has a consolidated trajectory (Pinenla et al., 2024), critiques of the transmissive model have been articulated for decades (King, 1993, cited in Tlalpachicatl et al., 2024).

The incorporation of artificial intelligence not only accelerates this transition but also renders it a functional necessity in contemporary higher education (Cárdenas et al., 2023; Vera, 2023). What is truly novel is not the promotion of activity itself, but rather the incorporation of technological and ethical competencies that were previously not part of the core teaching function. In this regard, the literature emphasizes the need to develop ethical knowledge that enables teachers to manage algorithmic biases, data privacy, and authorship rights in AI-generated content (Buele & Llerena-Aguirre, 2025; Mimoudi & Mokhtari, 2025).

Notably, the majority of existing studies continue to examine active methodologies, learning management systems, and artificial intelligence either independently or

in partial combinations, contributing to a fragmented understanding of how these dimensions jointly reshape teaching practice (Vásquez et al., 2020; Caballero et al., 2025; Tapalova & Zhiyenbayeva, 2022). Research explicitly integrating AI implementation within LMS platforms such as Moodle alongside socioconstructivist and active pedagogical approaches remains limited (Kaleci, 2025). This gap underscores the relevance of an integrative explanatory framework in which the transformation of the teaching role emerges from the combined interaction of LMS Moodle, active methodologies, and artificial intelligence, rather than from any single element in isolation (Mimoudi & Mokhtari, 2025; Buele & Llerena-Aguirre, 2025).

From this integrative perspective—understood as the combined interaction of LMS Moodle, active methodologies, and artificial intelligence—the delegation of informational tasks to technology frees teachers to focus on higher-order activities such as creation, collaboration, and complex problem solving, implying a profound transformation in the nature of their pedagogical role (Cárdenas et al., 2023; Tapia et al., 2025). The evidence analyzed indicates that active methodologies have been established as a transversal pedagogical standard in higher education, fostering the development of cognitive and social competencies (Haughton, 2019; McLain et al., 2023; Vásquez et al., 2020).

However, artificial intelligence introduces an inherent tension. On the one hand, it expands teaching capabilities through personalized learning, continuous feedback, and administrative efficiency (Acuña & Marrero, 2025; Merino-Campos, 2025; Tresipunt, 2025; Vieriu & Petrea, 2025). On the other hand, it poses significant ethical challenges related to data protection, algorithmic biases, and uncritical reliance by students (Mimoudi & Mokhtari, 2025; Deckker & Sumanasekara, 2025). These tensions are reflected in research on automated assessment, where questions arise concerning reliability and academic integrity (Arise et al., 2024), as well as the need to establish clear institutional guidelines for the use of generative AI (McDonald et al., 2025; Kumar et al., 2025). Likewise, learning analytics emerges as a strategic linchpin by enabling early identification of at-risk students and optimizing institutional decision-making, although its implementation requires adequate infrastructure and ethically responsible data management (Dixon et al., 2025; Tapalova & Zhiyenbayeva, 2022).

Within this integrative pedagogical framework—where active methodologies are supported by LMS infrastructure and enhanced by artificial intelligence—the discussion of the teaching role in the context of AI oscillates between a regulatory stance and a more formative approach. While some perspectives emphasize the need for control to preserve academic integrity in the face of so-called “AI-giarism,” others argue that strict regulation is insufficient amid rapid technological evolution. Consequently, AI is increasingly conceptualized as a catalyst for a shift toward facilitation and mediation of learning, consistent with the principles of active methodologies (Danault, 2025; Molina-Torres, 2024).

The transition from the “sage on the podium” to the “guide on the side” (Phillips, 2025) should not be understood as a substitution but rather as a strategic complement informed by professional judgment and teaching experience. The key lies in discerning when to employ direct instruction and when to promote student autonomy, a hybrid approach already present in contemporary university practice (Crisol-Moya et al., 2020; Phillips, 2025). This process of pedagogical transformation—characterized by the shift from content transmission to facilitation, mediation, and ethical guidance—is intensified by the rise of artificial intelligence, which consolidates the figure of the teacher as a moderator, facilitator, and learning companion. This role is particularly relevant for fostering student autonomy and self-regulation (Adhikar & Pandey, 2025; Buele & Llerena-Aguirre, 2025; Lima & Santos, 2024).

5. Conclusions

From the analysis carried out, the discussion allows delimiting the concept of the teacher as an “Architect of Critical and Adaptive Learning,” understood as a professional who articulates LMS technology, the pedagogical protagonism of active methodologies, and ethical mediation in the use of artificial intelligence (Adhikar & Pandey, 2025; Mimoudi & Mokhtari, 2025). The study corroborates that the profile of the teacher in higher education is deeply conditioned by the interrelation between Moodle, active methodologies, and artificial intelligence, and that this transformation does not imply the replacement of teaching staff, but rather the configuration of a more complex, critical, and strategic role that integrates pedagogical, technological, and ethical competencies (Caballero et al., 2025; Cárdenas et al., 2023).

In response to the objective of this research, three main contributions are identified. At the LMS level, the teacher is transformed into a mediator and manager of a digital ecosystem designed to foster meaningful interactions and to use learning analytics in accordance with institutional sustainability criteria (Calás, 2022; Prada & Beltrán, 2024). From the perspective of active methodologies, teachers position themselves as creators of learning experiences that promote autonomy, collaboration, and critical thinking, while simultaneously facing challenges associated with workload and cultural resistance (Carpena & Esteve, 2022; Cabrera & González, 2025; Talpachicatl et al., 2024). From the artificial intelligence dimension, the teacher emerges as a curator and ethical supervisor, responsible for ensuring academic quality, transparency, and the development of algorithmic literacy (Acuña & Marrero, 2025; Mimoudi & Mokhtari, 2025; Tresipunt, 2025).

In practical terms, this professional profile translates into actions such as designing interdisciplinary projects linked to real-world problems, gamifying training processes, implementing inverted classrooms focused on critical reflection, curating AI-generated content, guiding ethical debates, and using learning analytics to provide timely feedback. These practices demonstrate that technology does not replace the teacher, but rather enhances the integral formation of students.

Finally, this study presents limitations associated with its narrative nature, the availability of sources, and the dynamic evolution of the educational technologies analyzed (Ferrari, 2015; McDonald et al., 2025). Consequently, the development of longitudinal empirical research and international comparative studies is recommended in order to further explore the ethical, cultural, and sustainability-related dilemmas linked to the integration of artificial intelligence in higher education (Li & Gao, 2025).

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Abbreviations

The following abbreviations are used in this manuscript:

PBL	Project-Based Learning
CBL	Challenge-Based Learning
ICL	Inverted classroom
AI-TPACK	Artificial Intelligence–Technological Pedagogical Content Knowledge
AIA-PCEK	Artificial Intelligence Agent–Pedagogical Content Ethical Knowledge
AI	Artificial Intelligence
LMS	Learning Management System
TPACK	Technological Pedagogical Content Knowledge

References

- Acuña, R., & Marrero, M. (2025). Integration of active methodologies and artificial intelligence in teaching sequences and series: A classroom experience in a blended course at the Costa Rica institute of technology. *Cuadernos de Investigación y Formación en Educación Matemática*, 18(2), 135–160.
- Adhikar, D., & Pandey, G. (2025). Integrating AI in higher education: Transforming teachers' roles in boosting student agency. *Educational Technology Quarterly*, 2025, 151–168. [\[CrossRef\]](#)
- AL-Takhayneh, S., Karaki, W., Hasan, R., Chang, B.-L., Shaikh, J., & Kanwal, W. (2022). Teachers' psychological resistance to digital innovation in Jordanian entrepreneurship and business schools: Moderation of teachers' psychology and attitude toward educational technologies. *Frontiers in Psychology*, 13, 1004078. [\[CrossRef\]](#)
- Arias, F. G. (2012). *El proyecto de investigación: Introducción a la metodología científica* (6th ed.). Editorial Episteme.
- Arise, O., Muzuva, M., Kader, R., & Chohan, F. (2024). Ethical concerns of artificial intelligence in student assessments from a higher education perspective. In *Proceedings of the focus conference (TFC 2024)*. Atlantis Highlights in Social Sciences, Education and Humanities. Atlantis Press. [\[CrossRef\]](#)
- Buele, J., & Llerena-Aguirre, L. (2025). Transformations in academic work and faculty perceptions of artificial intelligence in higher education. *Frontiers in Education*, 10, 1603763. [\[CrossRef\]](#)
- Caballero, S., Vergara, E., Gardi, V., & Rodriguez-Barbosa, J. (2025). Active methodologies in Latin American education: A systematic review on their impact on meaningful learning. *Revista Invecom*, 6(2), 1–9. [\[CrossRef\]](#)
- Cabrera, C., & González, E. (2025). El aprendizaje basado en proyectos como estrategia en la formación de competencias docentes en la universidad nacional de Loja. *Ciencia y Reflexión*, 4(3), 776–791. [\[CrossRef\]](#)
- Calás, D. (2022). Impacto del uso de Moodle en la enseñanza de la asignatura de gestión del conocimiento. *Revista Simón Rodríguez*, 2(4), 46–57. [\[CrossRef\]](#)
- Carpena, J., & Esteve, F. (2022). Gamified flipped classroom as a pedagogical strategy in higher education: A systematic review. *EDUTEC. Revista Electrónica de Tecnología Educativa*, 80, 84–98. [\[CrossRef\]](#)
- Cárdenas, M., Gutiérrez, M., & Oñate, J. (2023). Active methodologies in the digital age. Epistemic approach to the educational fact. *Revista Latinoamericana de Ciencias Sociales y Humanidades*, 4(1), 1–16. [\[CrossRef\]](#)
- Chan, C. (2025). Students' perceptions of 'AI-giarism': Investigating changes in understandings of academic misconduct. *Education and Information Technologies*, 30, 8087–8108. [\[CrossRef\]](#)
- Crisol-Moya, E., Romero-López, M., & Caurcel-Cara, M. (2020). Active methodologies in higher education: Perception and opinion as evaluated by professors and their students in the teaching-learning process. *Frontiers in Psychology*, 11, 1703. [\[CrossRef\]](#)
- Danault, R. (2025). *Adapting to AI: The evolving role of faculty in higher education* (pp. 1–12). University of New Hampshire Scholars Repository. Available online: https://scholars.unh.edu/faculty_pubs/2156/ (accessed on 1 March 2026).
- Deckker, D., & Sumanasekara, S. (2025). The role of artificial intelligence in education: Transforming learning and teaching. *EPRA International Journal of Research and Development*, 10(3), 5–15. [\[CrossRef\]](#)
- Dixon, N., Howe, R., & Richter, U. (2025). Exploring learning analytics practices and their benefits through the lens of three case studies in UK higher education. *Research in Learning Technology*, 33, 3127. [\[CrossRef\]](#)
- Duran, M., Aciego, J., Gonzalez-Prieto, I., Carrillo-Rios, J., Gonzalez-Prieto, A., & Claros-Colome, A. (2025). A gamified active-learning proposal for higher-education heterogeneous STEM courses. *Education Sciences*, 15(1), 10. [\[CrossRef\]](#)
- Fernández-Olaskoaga, L., Guitert, M., Romeu, T., & Cerro, J. (2023). Learning analytics: A view on the design and assessment of asynchronous online discussions for better teaching performance. *Education Sciences*, 13(10), 1064. [\[CrossRef\]](#)
- Ferrari, R. (2015). Writing narrative style literature reviews. *Medical Writing*, 24(4), 230–235. [\[CrossRef\]](#)
- Haroud, S. (2025). Generative AI in higher education: Teachers' and students' perspectives on support, replacement, and digital literacy. *Education Sciences*, 15(4), 396. [\[CrossRef\]](#)

- Harvard University. (2025). *Academic integrity and teaching with(out) AI*. Available online: <https://oaisc.fas.harvard.edu/academic-integrity-and-teaching-without-ai/> (accessed on 3 March 2026).
- Haughton, N. (2019). Active learning strategies and competency-based design in research education: A longitudinal review. *Journal of the Scholarship of Teaching and Learning*, 19(4), 58–77. [CrossRef]
- Hernández, R., Fernández, C., & Baptista, M. (2014). *Metodología de la investigación* (6th ed.). McGraw-Hill.
- Kaleci, D. (2025). Integration and application of artificial intelligence tools in the Moodle platform: A theoretical exploration. *Journal of Educational Technology and Online Learning*, 8(1), 100–111. [CrossRef]
- King, A. (1993). From sage on the stage to guide on the side. *College Teaching*, 41(1), 30–35. [CrossRef]
- Kumar, A., Shankar, A., Hollebeek, L., Behl, A., & Lim, W. (2025). Generative artificial intelligence (GenAI) revolution: A deep dive into GenAI adoption. *Journal of Business Research*, 189, 115160. [CrossRef]
- Li, M., & Gao, L. (2025). Navigating the challenges of AI integration in education: Strategies for equitable and effective implementation. *International Journal of Research and Innovation in Social Science (IJRISS)*, 9(3), 6109–6116. [CrossRef]
- Lima, C., & Santos, G. (2024). Contributions of active learning methodologies in accounting: An integrative review. *Revista de Contabilidade e Organizações*, 17, e211942. [CrossRef]
- McDonald, N., Johri, A., Ali, A., & Collier, A. (2025). Generative artificial intelligence in higher education: Evidence from an analysis of institutional policies and guidelines. *Computers in Human Behavior: Artificial Humans*, 3, 100121. [CrossRef]
- McLain, N., Collins, M., & Baskin, L. (2023). Active learning methodologies in a high stakes graduate nursing program active learning methodologies in a high stakes graduate nursing program. *International Journal for the Scholarship of Teaching and Learning*, 17(1), 20. [CrossRef]
- Merino-Campos, C. (2025). The impact of artificial intelligence on personalized learning in higher education: A systematic review. *Trends Higher Education*, 4(2), 17. [CrossRef]
- Mimoudi, A., & Mokhtari, K. (2025). 'AIA-PCEK': A new framework for teaching with AI. *Cogent Education*, 12(1), 2563171. [CrossRef]
- Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & The PRISMA Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Medicine*, 6(6), E1000097. [CrossRef] [PubMed]
- Molina-Torres, M. (2024). Flipped classroom to teach digital skills during COVID-19. *Journal of Technology and Science Education*, 14(1), 158–168. [CrossRef]
- Moodle. (2021). *Foros*. Available online: <https://docs.moodle.org/all/es/Foros> (accessed on 26 February 2026).
- Mosquera Ayala, A. M. (2018). ERIC una alternativa para la búsqueda de información académica dirigida a investigadores del área de educación. *Sophia*, 14(2), 1–3. [CrossRef]
- Phillips, D. (2025). *Don't yank the sage from his stage. Postmodern teaching fads are compromising student learning*. The James G. Martin Center for Academic Renewal. Available online: <https://jamesgmartin.center/2025/08/dont-yank-the-sage-from-his-stage/> (accessed on 12 December 2025).
- Pinenla, J., Saransig, G., Allauca, D., Vega, M., & Lanchimba, F. (2024). Aula invertida, aprendizaje basado en problemas y gamificación, como metodologías activas en aulas diversas. *Revista Científica Retos de la Ciencia*, 1(4), 61–72. [CrossRef]
- Prada, J., & Beltrán, A. (2024). Aprendizaje adaptativo para Moodle desde la IA. *Ciencia Latina Educación*, 8(5), 14173–14194. [CrossRef]
- Purdue University. (2024). *How has technology changed education?* College Education. Available online: <https://education.purdue.edu/2024/01/how-has-technology-changed-education/> (accessed on 15 November 2025).
- Sandelowski, M., & Barroso, J. (2007). *Handbook for synthesizing qualitative research*. Springer Publishing Company.
- Sejdiu, N. P., & Sejdiu, S. (2025). The quiet transformation of higher education in the AI era. *Open Research Europe*, 5, 249. [CrossRef]
- Shirshikov, D. (2025). *Exploring the future of learning management with Moodle*. Fullmind. Available online: <https://www.fullmindlearning.com/blog/future-of-learning-management-with-moodle> (accessed on 11 December 2025).
- Singh, D. (2022). A case study on Moodle: An effective learning management system in the present scenario. *International Journal of Multidisciplinary Educational Research*, 2(4), 11–18.
- Singh, R. (2023). Transforming higher education: The power of artificial intelligence. *International Journal of Multidisciplinary Research in Arts, Science and Technology*, 1(3), 13–18.
- Tapalova, O., & Zhiyenbayeva, N. (2022). Artificial intelligence in education: AIED for personalised learning pathways. *The Electronic Journal of e-Learning*, 20(5), 639–653. [CrossRef]
- Tapia, D., Freire, L., & Hallo, E. (2025). Project-based learning: An innovative educational approach to active teaching. *Reincisol*, 4(7), 320–341. [CrossRef]
- Templier, M., & Paré, G. (2015). A framework for guiding and evaluating literature reviews. *Communications of the Association for Information Systems*, 37, 112–137. [CrossRef]
- Thomas, J., & Harden, A. (2008). Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Medical Research Methodology*, 8, 45. [CrossRef] [PubMed]
- Tlalpachicatl, N., Pérez, C., & Pérez, C. (2024). Flipped classroom in higher education. Analysis of a research methods course in educational psychology. *Revista Iberoamericana de Educación*, 95(1), 161–177. [CrossRef]

- Tresipunt. (2025). *Cómo aplicar la inteligencia artificial en tus cursos Moodle: Ejemplos reales y herramientas clave*. Available online: <https://tresipunt.com/es/como-aplicar-la-inteligencia-artificial-en-tus-cursos-moodle/> (accessed on 10 January 2026).
- Usher, A. (Interviewer). (2025). *The learning centred university with steven mintz*. Higher Education Strategy Associates. Available online: <https://higherstrategy.com/the-learning-centred-university-with-steven-mintz/> (accessed on 3 January 2026).
- Vásquez, M., Dos Santos, V., & Ortiz, J. (2020). Active methodologies of learning and educational technologies in higher education. *Global Journal of Human-Social Science: Linguistics & Education*, 20(10), 51–59.
- Vera, F. (2023). Faculty members' perceptions of artificial intelligence in higher education: A comprehensive study. *Revista Electrónica Transformar*, 4(3), 55–68.
- Vieriu, A., & Petrea, G. (2025). The impact of artificial intelligence (AI) on students' academic development. *Education Sciences*, 15(3), 343. [CrossRef]
- Villamar, A., & Sánchez, R. (2024). Explorando las bases pedagógicas de la gamificación como enfoque metodológico en la enseñanza superior. *Educación*, 33(65), 166–188. [CrossRef]
- Wang, K., Cui, W., & Yuan, X. (2025). Artificial intelligence in higher education: The impact of need satisfaction on artificial intelligence literacy mediated by self-regulated learning strategies. *Behavioral Sciences*, 15(2), 165. [CrossRef] [PubMed]
- Xu, H., & Mahenthiran, S. (2016). Factors that influence online learning assessment and satisfaction: Using Moodle as a learning management system. *International Business Research*, 9(2), 1–18. [CrossRef]

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