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AI-Driven Pedagogy for the Modern Classroom: A Human-Centred Framework for Teaching and Learning Across Disciplines

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Abstract: *Artificial intelligence (AI) is reshaping educational practices by supporting personalised instruction, adaptive learning, automated feedback, virtual simulations, and data-informed teaching. However, the educational benefits of AI depend on the quality of its implementation, the relevance of its applications, and the continued involvement of educators in instructional decisions. This article examines AI-driven pedagogy across science, humanities, mathematics, engineering, medical education, and commerce. It synthesises selected academic literature and educational policy guidance to identify major applications, implementation challenges, and opportunities for responsible integration in higher education. A narrative literature-review methodology is adopted to organise the evidence into instructional mechanisms, disciplinary applications, institutional requirements, and ethical safeguards. The article proposes a Human-Centred AI Pedagogy Framework that connects learner needs, AI-supported instruction, formative feedback, educator oversight, and continuous evaluation. It also introduces a five-stage institutional implementation model encompassing preparation, pilot testing, evaluation, integration, and improvement. The analysis indicates that AI has considerable potential to support differentiated instruction and timely feedback, but the effectiveness of individual applications must be established through appropriate assessment rather than assumed from technological capability. The article concludes that responsible AI integration requires teacher development, equitable access, data protection, academic integrity, and systematic evaluation of learning outcomes.*

Keywords: Artificial Intelligence, AI-Driven Pedagogy, Adaptive Learning, Intelligent Tutoring Systems, Generative AI, Higher Education, Educational Technology, Responsible AI.

1. Introduction

Education is increasingly influenced by digital technologies that change how knowledge is presented, understood, assessed, and applied. Traditional instructional approaches remain essential, but standardised teaching methods may not always address the different learning speeds, prior knowledge, language abilities, and educational requirements of individual students. Artificial intelligence offers additional methods for responding to these differences through adaptive practice, conversational tutoring, automated feedback, content generation, and learning analytics.

AI in education is not limited to the use of chatbots or the automatic production of teaching materials. It includes computational systems that analyse learner responses, recommend appropriate activities, identify patterns in assessment data, support simulation-based practice, and assist educators in planning instruction. A systematic review by Wang et al. identifies adaptive learning, personalised tutoring, intelligent assessment, learner profiling, and predictive applications as major areas of AI-in-education research.

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The emergence of generative AI has further expanded these possibilities. Students can use conversational systems to explore unfamiliar concepts, request alternative explanations, practise languages, and receive assistance with programming or writing. Educators can use AI to develop preliminary lesson plans, create differentiated learning materials, and design formative questions. Nevertheless, generated responses may contain factual errors, fabricated references, biased assumptions, or explanations that are unsuitable for the learner's level. UNESCO therefore recommends a human-centred approach that addresses privacy, educational suitability, equity, and responsible use.

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In India, AI-supported education must be considered in relation to the National Education Policy 2020, the expansion of digital-learning platforms, multilingual classrooms, and differences in institutional resources. Technology adoption alone cannot guarantee improved learning. Reliable connectivity, accessible content, teacher preparation, and suitable assessment practices remain important conditions for successful implementation.

This article approaches AI as a pedagogical support system rather than a replacement for teachers. It investigates how AI can support learning across disciplines, what risks institutions must manage, and how educational organisations can evaluate its practical contribution.

1.1 Research problem

Despite growing interest in AI-supported education, institutions may face difficulty selecting appropriate tools, integrating them into curriculum design, evaluating educational effectiveness, and developing consistent policies for responsible use. Tool-focused discussions can also overlook the distinction between completing a task more quickly and helping students develop durable knowledge and independent skills.

The central research problem is therefore the lack of a sufficiently practical connection between AI capabilities, pedagogical objectives, educator responsibilities, and measurable learning outcomes.

1.2 Research aim

To develop an evidence-informed, human-centred framework for integrating AI-supported pedagogy into teaching and learning across disciplines in higher education.

1.3 Research objectives

1. To examine the principal mechanisms through which AI supports teaching and learning.
2. To identify potential applications across major academic disciplines.
3. To compare the strengths and limitations of different categories of educational AI tools.
4. To examine ethical, pedagogical, technological, and institutional barriers.
5. To propose an implementation framework and indicators for evaluating AI-supported education.

1.4 Research questions

- RQ1: What are the principal applications of AI-supported pedagogy?
- RQ2: How can AI applications be adapted to different academic disciplines?
- RQ3: What factors influence responsible and equitable AI adoption?
- RQ4: How can institutions evaluate the educational value of AI interventions?

2. Review of Literature

2.1 Evolution of AI in education

AI in education has developed from specialised tutoring systems and rule-based instructional applications towards adaptive platforms, predictive analytics, and generative AI assistants. Earlier approaches frequently concentrated on structured tasks, such as practising mathematical procedures or receiving feedback on predefined questions. Contemporary applications can support more open-ended activities, including discussion, writing, programming, and the exploration of complex scenarios.

Luckin et al. argue that AI can support educational processes by helping teachers understand learning needs and develop more responsive learning environments [1]. This perspective suggests that the value of AI should be judged by its contribution to learning rather than by the sophistication of its underlying technology.

Bloom's research on individual tutoring established an influential benchmark for personalised instruction [2]. However, the original research concerned tutoring arrangements, not modern AI systems. Its findings should therefore be treated as a pedagogical motivation for investigating personalised learning rather than evidence that AI automatically reproduces the benefits of human tutoring.

2.2 Adaptive learning and intelligent tutoring systems

Adaptive learning systems adjust the sequence, difficulty, or presentation of learning activities in response to student performance. For example, a mathematics platform may provide additional practice when a student repeatedly struggles with a particular concept. An intelligent tutoring system may offer hints or stepwise explanations when a learner makes an error.

These systems can support differentiated instruction, especially where a teacher is responsible for a large class. However, the quality of adaptation depends on the accuracy of the learner model, the relevance of the instructional content, and the extent to which the system identifies genuine conceptual misunderstandings.

Wang et al.'s systematic literature review identified adaptive learning and personalised tutoring as prominent application categories within the AI-in-education literature [3]. The review also highlighted the diversity of research topics and methodologies, indicating the need to interpret findings according to their particular contexts.

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2.3 Generative AI and instructional support

Generative AI can produce explanations, practice questions, examples, summaries, code suggestions, and preliminary feedback. Its conversational format allows students to request clarification and explore a concept through multiple explanations.

For teachers, these capabilities can reduce some preparation tasks and provide starting points for differentiated teaching materials. Yet generated content must be checked for accuracy, relevance, accessibility, and alignment with the curriculum.

UNESCO's guidance emphasises human agency, privacy protection, age-appropriate use, and pedagogical validation when generative AI is used in education and research [4].

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Consequently, generative AI should be integrated into clearly defined instructional activities rather than treated as an unquestioned source of knowledge.

2.4 AI in higher education: governance and research quality

Bond et al. conducted a meta-systematic review of AI research in higher education and called for greater attention to ethics, collaboration, and methodological rigour [5]. Their work is particularly relevant to institutions seeking to move beyond isolated demonstrations towards evidence-based implementation.

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A recurring issue in educational technology research is that user satisfaction, adoption, efficiency, and learning outcomes represent different measures. Students may enjoy interacting with an AI tool without necessarily learning more. Similarly, faster feedback generation does not establish that the feedback is accurate or educationally beneficial.

Institutions should therefore assess AI interventions using multiple indicators, including subject knowledge, independent performance, retention, accessibility, staff workload, and potential harms.

2.5 AI and educational policy in India

India's National Education Policy 2020 supports the thoughtful integration of technology into education and highlights the importance of improving access, educational quality, and institutional capability [6].

Digital platforms such as DIKSHA and SWAYAM provide infrastructure for distributing educational content and supporting online learning. Their role should be distinguished from that of individual AI applications: not every digital learning platform or module uses adaptive AI.

For Indian colleges, a practical strategy is to combine established educational infrastructure with carefully selected AI applications. Institutions should consider local languages, connectivity constraints, faculty capacity, accessibility, and the costs of maintaining digital services.

2.6 Summary of the literature and research gap

The literature establishes that AI in education encompasses several distinct application areas and that responsible implementation requires attention to educational objectives, ethics, and research quality. Nevertheless, institutions still need practical guidance for translating these broad principles into decisions about classroom use and evaluation.

The gap addressed by this article is the need for an integrated framework that connects:

- Specific learning objectives with appropriate AI functions.
- AI-generated support with educator review.
- Classroom implementation with measurable outcomes.
- Technological innovation with accessibility, privacy, and academic integrity.

The proposed framework responds to this gap by combining instructional design, human oversight, and continuous evaluation within one implementation model.

3. Research Methodology

3.1 Research design

This study adopts a narrative literature-review and conceptual synthesis approach. It reorganises the supplied manuscript and examines selected academic publications and policy documents relevant to AI-supported teaching, adaptive learning, generative AI, and educational governance.

The study does not claim to be a systematic review or a primary empirical investigation. No new student survey, controlled experiment, or institutional dataset was collected.

3.2 Sources of information

The synthesis draws on the following categories of material:

1. Peer-reviewed literature on AI in education and intelligent tutoring.
2. Systematic and meta-systematic reviews of educational AI.
3. International guidance on generative AI and responsible educational use.
4. Indian educational policy, particularly the National Education Policy 2020.
5. The user-supplied manuscript, which provides the initial disciplinary examples and institutional integration concepts.

3.3 Analytical procedure

The material was organised into four themes:

- Instructional mechanisms: adaptive learning, tutoring, formative feedback, analytics, and simulation.
- Disciplinary applications: science, humanities, mathematics, engineering, health education, and commerce.
- Implementation requirements: faculty training, infrastructure, curriculum alignment, and institutional governance.
- Ethical safeguards: privacy, fairness, accessibility, transparency, and academic integrity.

These themes were then synthesised into the proposed Human-Centred AI Pedagogy Framework and a staged institutional implementation model.

3.4 Methodological limitations

The review does not report exhaustive database searches, formal screening procedures, or a quantitative meta-analysis. Its conclusions are therefore interpretive rather than statistical.

Furthermore, some percentage-based outcome claims in the original manuscript could not be independently established from the supplied reference details. They have not been presented as verified findings in this revised article.

The proposed framework requires testing through classroom studies and institutional pilots before its effectiveness can be established.

4. Concept and Mechanisms of AI-Driven Pedagogy

AI-driven pedagogy refers to the purposeful integration of AI capabilities into teaching design, learning activities, feedback, and assessment. Its distinguishing characteristic is not simply the presence of technology but the use of computational support to improve the relationship between learning needs and instructional responses.

4.1 Major instructional mechanisms

AI mechanism	Principal function	Illustrative application	Important limitation
Adaptive learning	Adjusts practice and content sequencing	Additional mathematics exercises based on learner responses	Adaptation may be inaccurate
Intelligent tutoring	Offers explanations, hints, and guided practice	Stepwise problem-solving assistance	May provide incorrect reasoning
Generative AI	Produces text, examples, questions, or code	Alternative explanations of a difficult concept	Outputs require verification
Automated feedback	Supports formative comments and preliminary assessment	Suggestions for improving a written assignment	Feedback may overlook nuance
Learning analytics	Identifies patterns in performance and participation	Flagging students who may need support	Correlation does not establish cause
Simulation and virtual practice	Creates repeatable learning scenarios	Virtual laboratory or engineering simulation	May not replace practical experience

The mechanisms are complementary but not interchangeable. A tutoring system designed for structured mathematics practice may not be suitable for evaluating an interpretive literature essay. Tool selection should therefore begin with the learning task, not with the availability of a particular product.

4.2 AI pedagogy compared with conventional educational technology

Dimension	Conventional digital learning	AI-supported pedagogy
Content delivery	Often presents predefined materials	May generate or adapt content
Feedback	Frequently follows fixed rules or instructor review	Can provide responsive, automated feedback
Personalisation	Often depends on learner choice or teacher intervention	May use performance patterns to adapt practice
Teacher role	Designs activities and supports learners	Retains these responsibilities while reviewing AI outputs
Evaluation	Measures learning through conventional assessment	Can additionally support analysis of learning patterns
Main concern	Access, usability, and content quality	These concerns plus model accuracy, privacy, bias, and over-reliance

These categories overlap. Conventional educational technology can be highly effective, and an AI application does not necessarily improve a well-designed non-AI learning activity.

5. AI-Driven Pedagogy Across Academic Disciplines

5.1 Science education

AI can support science learning through data analysis, virtual experiments, hypothesis generation, and explanations of complex scientific concepts. Students may use simulations to explore relationships among variables before conducting practical experiments.

For example, a biology instructor could ask students to compare AI-generated explanations of cellular processes against a prescribed textbook and scientific sources. In physics, students could use a simulation to examine how changing one variable affects a system.

The educator should ensure that simulated results are scientifically sound and that students still develop practical laboratory skills, experimental reasoning, and the ability to interpret unexpected results.

5.2 Humanities and social sciences

In humanities education, AI can support textual comparison, language practice, brainstorming, historical-source analysis, and the organisation of research questions.

Students might compare alternative summaries of a literary passage, identify differences in interpretation, and justify their own analysis using textual evidence. Language learners can practise vocabulary and conversation while receiving preliminary feedback.

However, AI-generated historical claims, quotations, and references may be inaccurate. Humanities teaching should therefore emphasise contextual understanding, source verification, cultural sensitivity, and independent argumentation.

5.3 Mathematics and statistics

AI-supported mathematics instruction can provide stepwise hints, alternative worked examples, practice questions, and feedback on common errors. Statistical learning activities may also use AI to explain concepts such as sampling, probability, regression, and data interpretation.

A useful classroom activity is to require students to solve a problem independently, consult an AI explanation, and then identify whether the explanation is correct and why. This makes verification and reasoning part of the learning process.

Assessment should include unfamiliar problems that students solve without AI assistance, allowing instructors to distinguish independent understanding from successful use of a tool.

5.4 Engineering and computer science

Engineering and computing students can use AI tools to explore design alternatives, explain code, identify potential programming errors, and generate initial test cases.

AI-assisted coding may be useful during supervised practice, but students must understand the generated code, assess its reliability, and explain design decisions. In engineering, generated suggestions must also be checked against technical standards, safety requirements, and domain knowledge.

A suitable assessment may require students to demonstrate their code, explain its logic, test edge cases, and justify their design choices.

5.5 Medical and health education

AI can support medical education through simulated cases, anatomy explanations, practice questions, and structured clinical-reasoning exercises. Students can explore hypothetical scenarios and explain why different diagnostic possibilities may or may not fit the available evidence.

Such applications must remain within educational boundaries. AI-generated clinical explanations may be incomplete or incorrect and must not replace validated instructional materials, qualified supervision, or established clinical protocols.

5.6 Commerce and management education

In commerce, accounting, economics, and management, AI can support spreadsheet practice, business-case analysis, financial calculations, report drafting, and scenario modelling.

For example, students may compare an AI-generated business recommendation with a spreadsheet-based analysis and explain differences in assumptions, calculations, and conclusions.

Teachers should require transparent working, source verification, and independent justification. Generated financial figures and market claims should never be accepted without checking their origin and accuracy.

Table 2. Cross-disciplinary applications and assessment

Discipline	Example learning activity	Evidence of learning
Science	Investigate a scientific concept using a simulation	Lab report and interpretation of results
Humanities	Compare AI-generated and source-based interpretations	Evidence-supported written argument
Mathematics	Review and correct an AI-generated solution	Independent problem-solving
Engineering	Use AI suggestions to debug a program	Tested code and oral explanation
Health education	Analyse a simulated case	Reasoned response assessed by an instructor
Commerce	Compare an AI-generated business case with calculations	Verified calculations and justified recommendations

Interpretation: These are proposed classroom applications, not measured outcomes from a new experiment. Their educational effectiveness should be established through appropriate evaluation.



6. Proposed Figure 1: Human-Centred AI Pedagogy Framework

Continuous safeguards

Privacy · Fairness · Accessibility · Transparency · Academic integrity

Figure 1. Proposed Human-Centred AI Pedagogy Framework. Source: Author's conceptual development, informed by UNESCO guidance and reviews of AI in education [3–5].

Explanation of Figure 1

The framework begins with the learner's educational context rather than with the technology itself. Learning objectives and prior knowledge guide the selection of an appropriate AI-supported activity. The system may then provide practice, explanations, or feedback, while the educator checks whether its outputs are accurate and pedagogically appropriate.

Continuous safeguards apply throughout the process. Student information should be protected, learning activities should remain accessible, and AI outputs should not become the sole basis for consequential academic decisions.

The framework also creates a feedback loop: evidence of learning informs subsequent instructional decisions. Its central proposition is that AI should extend educators' capacity to support learners while preserving human judgement and accountability.

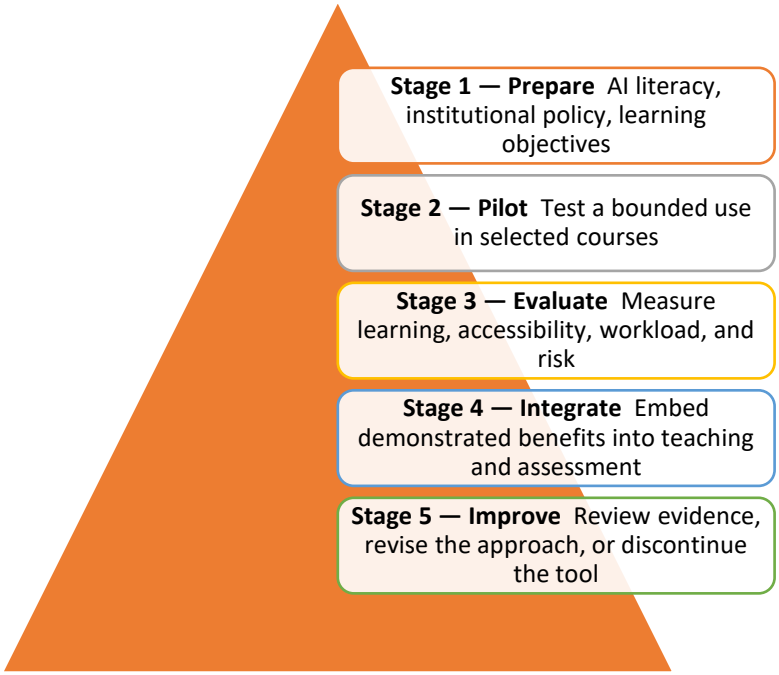
7. Comparative Evaluation of AI Tool Categories

Selecting an educational AI tool requires consideration of instructional purpose, reliability, accessibility, cost, and data governance. Specific product features and licensing terms may change, so institutions should verify them before adoption.

Table 3. Tool categories, strengths, and limitations

Tool category	Potential strengths	Key limitations	Recommended oversight
Adaptive learning platforms	Structured practice and personalised sequencing	May misinterpret learner difficulties	Teacher reviews progress and content
Conversational AI assistants	Flexible explanations and dialogue	May generate false or unsupported claims	Verify factual and academic content
Virtual laboratories	Repeatable and controlled simulations	Cannot fully reproduce all practical skills	Combine with practical instruction
AI coding assistants	Code explanations and debugging support	May suggest faulty or insecure code	Require testing and code explanation
Automated feedback tools	Faster preliminary feedback	May miss context or nuanced arguments	Instructor moderation
Learning analytics systems	Summarise participation and performance patterns	May produce misleading predictions	Contextual review and data protection

No single category is appropriate for every discipline. An institution should first define the instructional need, then compare available tools against agreed criteria.



8. Figure 2: Institutional AI Integration Cycle

Figure 2. Proposed Institutional AI Integration Cycle. Source: Author's conceptual development.

Explanation of Figure 2

The institutional integration cycle provides a structured approach to AI adoption.

- Prepare: Identify an educational problem, develop AI literacy, establish acceptable-use policies, and assess privacy and accessibility.
- Pilot: Introduce one or two clearly defined applications in selected courses.
- Evaluate: Compare results with a baseline or suitable comparison and document limitations.
- Integrate: Expand only practices that demonstrate educational value and meet institutional safeguards.
- Improve: Periodically reassess performance, costs, errors, and unintended consequences.

This approach reduces the risk of adopting tools simply because they are popular or technically impressive. It also provides a documented basis for institutional decisions.

9. Proposed Evaluation Framework for AI-Supported Learning

To determine whether an AI intervention is useful, institutions need indicators that extend beyond usage statistics.

Table 4. Suggested evaluation indicators

Evaluation dimension	Possible measure	Purpose
Learning outcomes	Pre- and post-assessments aligned with course objectives	Examine changes in demonstrated knowledge
Knowledge retention	Follow-up assessment after a suitable interval	Determine whether learning persists
Independent performance	Tasks completed without AI assistance	Assess independent competence

Engagement	Participation and task completion	Understand patterns of use
Feedback quality	Instructor-rated accuracy and relevance	Assess usefulness of AI feedback
Equity	Participation and outcomes across relevant learner groups	Identify access or outcome differences
Educator workload	Preparation, review, and correction time	Assess net workload effects
Academic integrity	Drafts, process records, explanations, and disclosure	Support fair assessment
Data governance	Access controls, retention practices, and incident records	Monitor privacy risks

These indicators are recommendations for future institutional evaluation, not findings from newly collected data.

A practical pilot could involve one course, a clearly defined learning outcome, an initial assessment, a limited implementation period, and a documented review. Where feasible, comparison groups or repeated measurements can help distinguish the intervention's contribution from other influences.

10. Ethical and Institutional Challenges

10.1 Accuracy and reliability

Generative AI can produce plausible but inaccurate explanations or references. Students and educators should verify factual claims against authoritative materials. Institutions should avoid using unverified AI outputs as the sole basis for grading or academic guidance.

10.2 Privacy and data protection

Educational AI systems may process student prompts, submitted work, performance information, and other personal data. Institutions should minimise unnecessary data collection, clarify the purposes of processing, control access, and review provider terms before use.

In India, the Digital Personal Data Protection Act, 2023, is relevant to institutional data-governance considerations. Institutions should obtain appropriate guidance regarding applicable legal requirements.

10.3 Algorithmic bias and fairness

AI systems may perform differently across languages, educational backgrounds, and learner groups. Bias can arise from training data, system design, or the way outputs are used.

Institutions should evaluate whether a tool works appropriately for their learners and provide alternative learning routes where access or suitability is uneven.

10.4 Academic integrity

AI-assisted work creates challenges for conventional assessment. Rather than relying exclusively on automated AI-detection scores, educators can use drafts, process documentation, oral explanations, classroom activities, and authentic problem-solving tasks to assess student understanding.

Institutional policies should distinguish acceptable assistance from undisclosed substitution for a learner's own work.

10.5 Faculty development

Successful implementation requires educators to understand both the capabilities and limitations of AI. Faculty development should address output verification, assessment design, accessibility, data protection, and the pedagogical selection of tools.

The educator's role can be understood through three complementary responsibilities:

- Curator: Selects and verifies educational content.
- Coach: Supports learner development, motivation, and independent reasoning.

- Co-designer: Integrates AI into meaningful and context-sensitive learning experiences.

10.6 The digital divide

Students may have unequal access to devices, reliable internet, accessible software, or language-appropriate resources. AI integration should therefore include alternatives for students who cannot use a particular system and should not make access to a paid tool a hidden requirement for academic success.

11. Findings and Discussion

The narrative synthesis leads to six principal findings.

Finding 1: AI-supported pedagogy is a collection of distinct instructional mechanisms. Adaptive practice, tutoring, generative explanations, formative assessment, analytics, and simulation address different learning needs. Selection should be based on the instructional task rather than on general claims about AI.

Finding 2: Personalisation is a major area of educational AI research. The systematic review by Wang et al. identifies adaptive learning and personalised tutoring among the prominent application categories. However, the breadth of the research field means that individual tools and interventions require context-specific evaluation.

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Finding 3: Educational value must be demonstrated rather than assumed. Faster content generation or higher platform engagement does not necessarily indicate better learning. Institutions should assess knowledge, retention, transfer, independent performance, and feedback quality.

Finding 4: Educator oversight remains essential. UNESCO's guidance and the U.S. Department of Education's report emphasise human-centred approaches to educational AI [4, 7]. AI should support instructional judgement without becoming an unchecked authority over academic decisions.

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Finding 5: Equity and governance are conditions of effective adoption. Infrastructure, language support, faculty capability, accessibility, privacy, and cost influence whether AI applications can be used responsibly and consistently.

Finding 6: Institutional adoption should be iterative. The proposed prepare–pilot–evaluate–integrate–improve cycle allows colleges to develop local evidence, respond to limitations, and avoid expanding applications before their educational value is established.

Together, these findings support the central argument of the article: the appropriate unit of innovation is not the AI tool itself but the complete teaching and learning process in which it operates.

12. Recommendations

Based on the review, the following recommendations are proposed for higher education institutions.

1. Begin with learning objectives. Identify a specific teaching or learning problem before choosing an AI application.

2. Establish institutional AI-use policies. Define acceptable use, disclosure expectations, data restrictions, instructor responsibilities, and procedures for reporting errors.

3. Provide faculty and student training. Develop skills in output verification, ethical use, source evaluation, and AI-aware assessment.

4. Pilot before scaling. Test applications in a limited number of courses and document baseline conditions, results, costs, and unintended effects.

5. Redesign assessment where necessary. Include independent problem-solving, oral explanation, practical demonstration, process documentation, and authentic tasks.

6. Protect accessibility and inclusion. Provide suitable alternatives for learners with limited connectivity, differing language needs, or accessibility requirements.

7. Evaluate total workload and cost. Include time spent reviewing and correcting AI outputs rather than measuring only the time saved during content generation.

8. Review tools periodically. Reassess accuracy, suitability, privacy, cost, and educational effectiveness, and discontinue tools that fail agreed standards.

13. Limitations and Future Research

This study has several limitations. First, it uses a narrative review and conceptual synthesis rather than a systematic review with exhaustive database searching and formal quality appraisal. Second, it does not present original experimental data, student surveys, or controlled comparisons. Third, the proposed framework has not yet been empirically validated across institutions or disciplines.

Future research should investigate the effectiveness of specific AI-supported activities through transparent and appropriately designed classroom studies. Longitudinal research could examine whether short-term improvements translate into durable learning and independent competence. Studies in Indian higher education should also consider regional languages, institutional resources, accessibility, faculty development, and differences in student access to technology.

Further work could develop validated indicators for the Human-Centred AI Pedagogy Framework and test whether the proposed implementation cycle improves institutional decision-making. Comparative studies should report the instructional context, sample characteristics, assessment methods, limitations, and any relevant conflicts of interest.

14. Conclusion

Artificial intelligence offers new opportunities to support personalised practice, timely feedback, simulation, content development, and data-informed instruction across academic disciplines. However, its educational value depends on the relationship between technological capability, curriculum objectives, learner needs, and educator judgement. This article proposes a Human-Centred AI Pedagogy Framework that combines AI-supported instruction with formative feedback, human oversight, and continuous safeguards. Its five-stage implementation cycle encourages institutions to prepare users, conduct limited pilots, evaluate outcomes, integrate demonstrated benefits, and improve or discontinue applications based on evidence. The review is limited by its narrative methodology and the absence of newly collected empirical data; therefore, the proposed framework should be treated as a conceptual contribution requiring further validation. Future research should prioritise longitudinal learning outcomes, equitable access, regional-language applications, and transparent evaluation. Responsible AI adoption should ultimately be measured by improved learning, stronger independent reasoning, fair access, and the quality of teaching rather than by the extent of automation alone.

References

1. Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). Intelligence Unleashed: An Argument for AI in Education. Pearson Education.

2. Bloom, B. S. (1984). The 2 sigma problem: The search for methods of group instruction as effective as one-to-one tutoring. Educational Researcher, 13(6), 4–16. https://doi.org/10.3102/0013189X013006004

3. Wang, S., Wang, F., Zhu, Z., Wang, J., Tran, T., & Du, Z. (2024). Artificial intelligence in education: A systematic literature review. Expert Systems with Applications, 252, 124167. https://doi.org/10.1016/j.eswa.2024.124167

4. Miao, F., & Holmes, W. (2023). Guidance for Generative AI in Education and Research. UNESCO. https://doi.org/10.54675/EWZM9535

5. Bond, M., Khosravi, H., De Laat, M., et al. (2024). A meta-systematic review of artificial intelligence in higher education: A call for increased ethics, collaboration, and rigour. International Journal of Educational Technology in Higher Education, 21, Article 4. https://doi.org/10.1186/s41239-023-00436-z

6. Ministry of Education, Government of India. (2020). National Education Policy 2020. Government of India. Read the policy document

7. U.S. Department of Education, Office of Educational Technology. (2023). Artificial Intelligence and the Future of Teaching and Learning: Insights and Recommendations. Read the report

8. UNESCO. (2021). Recommendation on the Ethics of Artificial Intelligence. UNESCO. Read the recommendation