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Editorial:

AI For Next Generation Teaching and Learning Environments

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This themed issue, "AI for Next Generation Teaching & Learning Environments," addresses the influence of artificial intelligence (AI) in reshaping educational practices across school and higher education contexts. The adoption of these technologies signals a shift towards more adaptive, immersive, and data-informed learning environments. Despite this momentum, existing scholarship often presents these innovations in isolation, with limited attention given to their combined potential within integrated learning ecosystems. There is also a need for research that reflects diverse educational realities, particularly across varied socio-cultural and institutional settings. This issue responds to these gaps by bringing together studies that examine not only technological applications but also their pedagogical value, ethical implications, and relevance to equitable and sustainable education.

The issue aims to advance understanding of the integration of AI in teaching and learning. It focuses on innovative pedagogical approaches, the impact of this technology on instructional practices and student outcomes, and key considerations related to ethics, inclusivity, and accessibility. The contributions offer insights for educators, researchers, and policymakers, with clear links to both theory and practice. The issue also supports the development of future-ready learning environments that align with current demands in digital transformation.

This themed issue includes 18 articles from Bangladesh, Indonesia, Ireland, South Africa, India, Italy, Germany, Turkey, Nigeria, the United Arab Emirates, and Malaysia. The articles cover both school and university contexts and address areas such as AI-based learning tools, AR learning experiences, IoT-supported environments, digital assessment, teacher readiness, student engagement, and ethical use of technology. The issue presents a range of research designs, including quantitative and qualitative studies. Together, these studies

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offer a comprehensive view of next generation teaching and learning environments, with attention to both opportunities and challenges in the use of emerging technologies.

The contributions reflect a growing interest in how digital intelligence reshapes teaching, learning, and academic leadership across diverse educational contexts. The articles are organised into three interrelated themes: pedagogical innovation and classroom practice, ethical governance and human-centred leadership, and learner development and assessment in AI-mediated environments.

These studies highlight emerging instructional models, practical challenges, and context-sensitive strategies that aim to enhance engagement, equity, and educational quality. The issue also demonstrates how theory, empirical research, and applied practice intersect in meaningful ways. It offers insights into how educators, institutional leaders, and policymakers can respond to the rapid expansion of AI technologies while maintaining a commitment to human values and educational integrity.

This themed issue aligns closely with the mission of the APJEE, which seeks to promote rigorous and impactful scholarship that informs policy and improves teaching and learning across the Asia-Pacific region. The articles presented here contribute to this mission through research that remains grounded in regional realities while addressing global educational transformations driven by AI.

The theme of this issue centres on the transformative role of AI in shaping next generation teaching and learning environments across diverse educational contexts. This theme reflects a holistic perspective that positions AI not merely as a technological tool, but as a catalyst for pedagogical change, institutional development, and learner transformation. In line with this focus, the issue is structured around three interrelated sub-themes. The first sub-theme, Pedagogical Innovation and Classroom Practice, examines how AI supports new forms of teaching, learning design, and classroom implementation. The second sub-theme, Ethical Governance and Human-Centred Leadership, addresses the role of educators and institutional leaders in ensuring responsible, transparent, and value-driven use of AI in education. The third sub-theme, Learner Development and Assessment in AI-Mediated Environments, explores how AI influences student learning processes, skill development, and assessment practices. Together, these sub-themes provide a coherent framework that captures the complexity and breadth of AI integration in education and highlight the need for balanced approaches that combine technological advancement with pedagogical and ethical foundations.

SUB-THEME 1: PEDAGOGICAL INNOVATION AND CLASSROOM PRACTICE

This theme brings together studies that examine how AI and emerging technologies reshape instructional design and classroom interaction within next generation learning environments. For instance, Hossain et al. study on AI and IoT in education highlights how

interconnected systems enhance classroom interactivity and student engagement through responsive and data-informed environments. Several articles focus on the enhancement of student engagement through interactive and immersive approaches.

Abu Hassan et al. work on augmented reality in a primary school reading module demonstrates how multimodal representation supports reading comprehension among young learners, reinforcing findings from prior studies that emphasise the role of immersive technologies in cognitive engagement (Poupard et al., 2025).

The role of generative AI in instructional practice also receives significant attention. Pratama and Arsanti's exploration of ChatGPT in higher education grammar instruction, grounded in Kolb's Experiential Learning Theory, shows how structured interaction with AI tools supports deeper understanding of language use. This aligns with recent work that positions generative AI as a facilitator of experiential and reflective learning (Lin et al., 2025). Similarly, Goyal and Chander's study on a GenAI-supported approach to lesson planning presents a model that assists teachers in designing inclusive science instruction with greater efficiency and adaptability. These studies suggest that AI does not merely enhance efficiency but redefines the nature of instructional design by enabling iterative, adaptive, and learner-responsive pedagogical processes. These contributions also illustrate how AI tools can be aligned with established pedagogical theories to support deeper learning, critical engagement, and meaningful knowledge construction, rather than functioning as instruments for automation or task completion.

Mathematics education provides another important context. Abdull Hamid and Ahmad's study on co-teaching with AI in mathematics education outlines a shift in pedagogical roles, where teachers and intelligent systems operate in complementary ways. This reflects emerging discourse on human-AI collaboration in classrooms (Chiu & Rospigliosi, 2025; Kong et al., 2025), which highlights both opportunities for personalised learning and tensions related to teacher agency and instructional control. The findings identify both opportunities for personalised support and challenges related to teacher agency and instructional control. From an editorial perspective, this contribution is significant as it extends current literature by situating AI not as a replacement, but as a pedagogical partner, thus requiring a rethinking of teacher identity and professional practice.

A systematic review by Che Amran et al. on augmented reality in Arabic language teaching further strengthens this theme by synthesising evidence within the Malaysian context and identifying effective pedagogical practices. This review provides researchers with a consolidated understanding of what works, for whom, and under what conditions, which remains a critical gap in current AR literature. Taken together, these contributions demonstrate that technology-enhanced pedagogy requires thoughtful design, contextual awareness, and continuous professional reflection in next generation classrooms. Overall, this sub-theme provides a comprehensive understanding of how pedagogical innovation with AI evolves across disciplines and reinforces the importance of aligning technological affordances with sound educational theory and context-sensitive practice. This emphasis is consistent with prior literature, which highlights that the effectiveness of AI in

education depends not solely on technological capability, but on its pedagogical grounding and contextual integration (Dai et al, 2024; Vorobyeva et al., 2025). In this regard, the contributions in this sub-theme extend existing scholarship by offering empirically grounded examples that demonstrate how theory-informed and context-aware approaches can enhance the meaningful use of AI in diverse educational settings.

SUB-THEME 2: ETHICAL GOVERNANCE AND HUMAN-CENTRED LEADERSHIP

The second theme addresses the ethical, institutional, and leadership dimensions of AI integration in next generation teaching and learning environments. Mohamed et al. study on the ethical use of AI technology among university students in Pahang provides an important empirical foundation by identifying patterns of use alongside emerging ethical concerns, including issues related to misuse, over-reliance, and limited awareness of responsible practices. These findings resonate with growing concerns in the literature on AI ethics in education, which emphasise the need for structured governance frameworks and institutional policies (Biagini, 2025; Usher & Barak, 2024). Such evidence highlights that technological adoption without ethical guidance may lead to unintended consequences, thus reinforcing the urgency for policy-level interventions and curriculum integration of AI ethics.

Leadership emerges as a central factor in shaping AI-driven educational environments. Inda et al. work on human-centred academic leadership, based on insights from Universiti Teknologi Malaysia, foregrounds values such as empathy, inclusivity, and ethical responsibility as core elements of institutional transformation. This perspective aligns with contemporary leadership theories that advocate for relational and value-driven approaches in times of technological change (Islami et al., 2025). From an editorial standpoint, this contribution is particularly significant as it shifts the discourse from technology adoption to leadership responsibility, positioning academic leaders as key agents who mediate between innovation and institutional integrity.

The issue of accountability is further examined in Abu-Rasheed and Roddeck's study on explainable artificial intelligence (XAI) in automated grading systems, which frames transparency not only as a technical requirement but also as a pedagogical and ethical necessity. This work extends current discussions on algorithmic accountability (Cheong, 2024; Novelli et al., 2024) by demonstrating how explainability can function as a design principle that fosters trust, fairness, and informed decision-making in educational assessment. Such insights are critical in contexts where AI-driven evaluation systems risk obscuring decision processes, thereby challenging principles of equity and academic judgement.

Teacher agency forms another key focus within this theme. Williyan et al. interpretative phenomenological study on Indonesian EFL lecturers reveals how moral considerations shape instructional decisions in AI-supported writing classrooms. The findings suggest that

educators actively negotiate between technological possibilities and ethical boundaries, thus reinforcing the view that teacher agency remains central in AI-mediated environments (Mouta et al., 2025). This perspective contributes to ongoing debates by illustrating that ethical integration of AI depends not only on institutional frameworks, but also on individual educators' professional judgement and values.

In addition, Chuan et al. IEEC framework for AI literacy in programming education provides a structured approach to developing critical competencies among learners, including awareness, evaluation, and responsible use of AI technologies. This aligns with emerging frameworks that position AI literacy as a fundamental component of 21st-century education and highlights the need for systematic curriculum design that integrates ethical and technical dimensions of AI (Salhab & Aboushi, 2025).

Collectively, the contributions in this sub-theme emphasise that AI integration in education extends beyond technical implementation and requires a foundation in ethical governance, leadership vision, and human-centred values. The significance of this sub-theme lies in its ability to connect micro-level practices, such as classroom decision-making, with macro-level considerations, including institutional policy and global ethical standards. This integrated perspective advances current literature by demonstrating that sustainable and responsible AI adoption depends on the alignment of technological innovation with ethical accountability, leadership commitment, and the cultivation of informed and critical users within educational systems.

SUB-THEME 3: LEARNER DEVELOPMENT AND ASSESSMENT IN AI-MEDIATED ENVIRONMENTS

The third theme centres on how AI influences learner cognition, motivation, and assessment practices in next generation teaching and learning environments. Vasodavan and Jain's action research on AI-supported language learning among non-native English-speaking students provides evidence that AI tools can support language development when pedagogical objectives remain clearly defined and systematically implemented. This finding aligns with prior research which emphasises that the effectiveness of AI in language learning depends on structured instructional design rather than tool availability alone (Feng, 2025; Hong & Guo, 2025). In this regard, AI emerges not as an autonomous tutor, but as a mediated support system that requires intentional pedagogical alignment.

Metacognitive awareness also receives critical attention. Mohd Ramli et al. study on students' purpose and metacognitive strategies in AI-supported language learning highlights that successful outcomes depend on learners' ability to regulate, evaluate, and strategically use AI tools. This reinforces established perspectives in self-regulated learning theory (Zimmerman, 1989), which position metacognition as a key determinant of meaningful learning outcomes. The contribution is significant as it extends existing literature by demonstrating that AI integration amplifies, rather than replaces, the need for learner agency and reflective engagement.

Yeasmin et al. study on students' perceptions and prospects of AI integration in higher education provides further insight into how learners interpret and respond to the presence of AI in academic contexts. The findings indicate varying levels of readiness, acceptance, and concern, which reflect broader trends identified in recent literature on student attitudes towards AI (Kim et al., 2024). This contribution highlights that learner perception shapes the effectiveness of AI adoption and suggests that successful integration requires not only technological and pedagogical readiness, but also attention to students' beliefs, expectations, and digital confidence.

Assessment practices form another important dimension within this theme. Acan and Kaban's comparative study on human and machine feedback in evaluating secondary EFL learners' writing provides a nuanced analysis of the capabilities and limitations of ChatGPT-4 in assessment contexts. The findings indicate that AI-generated feedback can enhance efficiency and consistency yet lacks the contextual sensitivity and interpretive depth associated with human judgement. This echoes ongoing debates on automated assessment (Liang, 2025), which caution against over-reliance on algorithmic systems in complex evaluative tasks. From an editorial perspective, this work is particularly important as it highlights the need for hybrid assessment models that integrate AI efficiency with human expertise to ensure validity and fairness.

The role of AI as an educational companion extends to specialised domains. Kanapathy and Shamini's study on ChatGPT in legal education demonstrates how AI can support conceptual understanding and knowledge acquisition, yet raises critical concerns regarding reliability, accuracy, and academic integrity. Such concerns are consistent with emerging discussions on generative AI in higher education (Lund et al., 2025), which emphasise the importance of critical engagement and verification practices when using AI-generated content. This contribution emphasises that the pedagogical value of AI depends on disciplined and informed use rather than passive acceptance.

Personalisation at scale represents a further area of significance. Jain et al. study on AI-generated bilingual avatars and adaptive feedback illustrates how personalised learning experiences can enhance engagement and comprehension across diverse learner groups. This aligns with literature on adaptive learning systems, which highlight the potential of AI to tailor instruction to individual learner profiles (Katiyar et al., 2024). In parallel, Darmi et al. think-aloud study on AI use in thesis writing reveals the importance of strategic thinking, self-regulation, and critical decision-making during complex academic tasks. These findings extend current understanding by showing that higher-order academic work in AI-supported environments demands not only cognitive skills, but also strong metacognitive control and ethical awareness (Zhang et al., 2025).

Collectively, the contributions in this sub-theme demonstrate that AI-mediated learning environments influence not only academic performance, but also learner autonomy, identity, and long-term development. The significance of this theme lies in its integration of cognitive, metacognitive, and evaluative dimensions, which are often examined separately in existing literature. By situating AI within these interconnected domains, the studies

advance current scholarship and highlight that effective AI integration depends on the development of reflective, self-regulated, and critically aware learners who can navigate increasingly complex digital learning ecosystems.

CONCLUSION

The articles in this themed issue collectively extend current understanding of how AI shapes next generation teaching and learning environments across three interrelated sub-themes: pedagogical innovation and classroom practice, ethical governance and human-centred leadership, and learner development and assessment in AI-mediated environments. Across these domains, consistent evidence emerges that effective AI integration requires more than technological adoption; rather, it depends on the alignment between innovation, human values, and contextual realities. This conclusion is supported by multiple contributions in this issue. The findings also suggest that meaningful AI integration occurs when technological affordances are intentionally connected to pedagogical design, ethical principles, and learner-centred practices.

Future research should therefore address the persistent gap between experimental implementation and everyday classroom practice, as several studies in this issue indicate that successful outcomes often depend on controlled conditions, structured guidance, or specific institutional support. This suggests that scalability and sustainability remain unresolved challenges. Comparative studies across regions may provide further insight into how different educational systems respond to similar technological opportunities and constraints, particularly in relation to policy readiness, teacher preparedness, and resource availability. In addition, the diversity of approaches observed in this issue points to the need for interdisciplinary collaboration, especially in areas that integrate education, computer science, and ethics, to develop solutions that are both technically robust and pedagogically meaningful.

Emerging topics such as explainable AI, adaptive learning systems, and human–AI collaboration in assessment require deeper investigation due to their increasing presence across multiple studies in this issue and their significant implications for transparency, personalisation, and decision-making in education. For instance, work on automated grading and AI-generated feedback raises questions about validity, bias, and the limits of algorithmic judgement, which cannot be fully addressed without further empirical and theoretical exploration. At the same time, the perspectives of teachers, students, and underrepresented communities remain essential, as several contributions reveal variations in ethical awareness, access, and readiness to engage with AI technologies. Future research should therefore adopt participatory and context-sensitive approaches, such as design-based research and longitudinal studies, to ensure that diverse voices inform the development and implementation of AI in education.

A balanced approach to AI in education must prioritise human agency, ethical responsibility, and pedagogical purpose as central guiding principles. This means that educators retain

decision-making authority in instructional and assessment processes, institutions establish clear ethical guidelines and accountability structures, and technologies are selected and implemented based on their educational value rather than novelty. Such an approach ensures that technological advancement contributes not only to efficiency and innovation, but also to equity, inclusion, and the broader goals of education in the Asia-Pacific region. In this context, equity refers to fair access to AI resources and learning opportunities across diverse socio-economic and geographical settings, inclusion involves the design of AI systems that accommodate diverse learner needs and abilities, and broader educational goals encompass the development of critical thinking, ethical awareness, and lifelong learning competencies. The implications of this are significant, as they call for coordinated efforts among educators, policymakers, and researchers to ensure that AI integration supports not only technological progress, but also socially responsible and educationally meaningful outcomes.

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