Editorial Overview

Transforming Education in the Age of Artificial Intelligence: From Adoption to Responsible, Context-Sensitive Implementation

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Artificial intelligence has moved rapidly from a specialist technological concern to a central issue in educational policy, pedagogy, academic practice, and institutional governance. The eight contributions in this Special Issue, "Transforming Education in the Age of Artificial Intelligence," illustrate that transition across classroom dialogue, system-level integration, AI literacy and equity, academic integrity, remote and island schooling, design education, and national policy implementation. Taken together, the papers show that AI in education is not a single technology with a uniform effect. Its educational significance emerges from the interaction among technological possibilities, teaching practices, learner agency, infrastructure, governance, ethics, and social inequality.

A central theme across the issue is a shift in emphasis from whether AI should be adopted to the conditions under which it should be used. The more consequential questions concern how AI is introduced, what educational purposes it serves, how its outputs are evaluated, how institutions protect human agency, and how benefits can be distributed without reproducing existing inequalities. The collective contribution of the issue is therefore best understood as a movement from an adoption-centred perspective toward responsible and context-sensitive implementation.

AI as a Pedagogical Resource and Challenge

Several contributions examine AI within teaching and learning environments. Wang and Miao (2026) focus on classroom dialogue in Chinese higher education, while Asdar et al. (2026) and Hamid et al. (2026) examine AI-supported project-based learning in remote and island-school settings. Uteulieva and Otepbergenov (2026) broaden the perspective to system-level integration in Uzbekistan. Across these contexts, AI appears less as a replacement for established pedagogy than as one component within a wider instructional ecosystem.

The educational value of AI depends on the pedagogical structure surrounding its use. Across several contributions, teacher mediation emerges as an important condition for meaningful AI-supported learning. Learners need opportunities not

only to receive AI-generated information but also to question, verify, compare, and sometimes reject it. This is particularly important in project-based and inquiry-oriented learning, where meaningful learning still requires students to formulate questions, examine evidence, test ideas, communicate findings, and make judgments.

From AI Use to AI Literacy

A second major theme is the distinction between learning with AI and learning about AI. Vanitha (2026) addresses this distinction directly through a framework for AI literacy and equity in resource-constrained settings. The wider set of papers reinforces the same conceptual point: successful use of AI-assisted tutoring, feedback, or content generation does not by itself demonstrate AI literacy.

AI literacy involves understanding system limitations, evaluating outputs, verifying information, exercising human judgment, and recognizing ethical and privacy implications. It also requires the capacity to decide when AI use is appropriate and when independent reasoning should take priority. In resource-constrained contexts, these competencies need not depend on continuous access to premium generative systems. The contributions therefore raise a broader question for future research: what is the minimum technological environment required for meaningful AI literacy?

Equity, Access, and Resource-Constrained Education

Digital inequality remains one of the most significant challenges for educational AI. The papers addressing resource-constrained, remote, and island environments remind us that discussions of AI often assume technological conditions that are far from universal. Access is not a single variable. It involves connectivity, devices, computing capacity, energy reliability, technical support, teacher expertise, language accessibility, institutional governance, and affordability.

A school may have internet access but lack sufficient devices; it may have devices but limited teacher capacity; an offline-capable system may still be linguistically or pedagogically unsuitable for the local context. For this reason, equitable implementation requires more than technological availability. The central challenge is to ensure that access is educationally meaningful, sustainable, safe, and sensitive to local conditions. The studies of remote and island-school settings are especially valuable in making this point visible within an international AI-in-education discussion that is often dominated by well-resourced institutions.

Algorithmic Judgment and Academic Integrity

The Special Issue also draws attention to a different dimension of educational AI: systems used to evaluate, detect, or classify student work. Liao and Ali Mohammed (2026) examine the relationship between lexical features and ZeroGPT

scores in Chinese L2 undergraduate writing. This line of research raises questions that differ from those surrounding AI-supported teaching because automated detection introduces algorithmic judgment into academic-integrity processes.

A detector-generated score, a classification decision, a false positive, and evidence of misconduct are not interchangeable categories. Institutions should therefore be cautious about treating automated outputs as sufficient evidence without contextual human review. Reliability, transparency, due process, and the educational consequences of algorithmic error deserve sustained attention as AI-detection systems become more visible in assessment and academic-integrity practice.

AI, Dialogue, Creativity, and Learning Processes

The contributions on classroom dialogue and design education highlight the need to study the quality of learning processes, not merely the presence of AI or the frequency of its use. In dialogic teaching, increased participation does not automatically mean that interaction has become more cumulative, critical, reciprocal, or conceptually productive. Future studies should therefore examine whether learners build on one another's ideas, challenge AI-generated claims, sustain independent reasoning, and participate more equitably in classroom dialogue.

A similar caution applies to design and creative education. Yang and Chou (2026) document rapid growth in research linking AI and design education, particularly in recent years. That expansion coincides with the growing visibility of generative systems in creative practice, but bibliometric prominence should not be confused with pedagogical effectiveness. Keyword networks can reveal relationships among research topics; they cannot, by themselves, determine how creativity is conceptualized or whether AI enhances creative learning. The next stage of research therefore requires deeper content analysis and empirical investigation of creative processes, authorship, visual reasoning, and human-machine collaboration.

Governance, Policy, and System-Level Integration

Policy-oriented contributions show that AI in education is increasingly a governance challenge as well as a pedagogical one. Safitri (2026) illustrates how curriculum policy, personal-data protection, child protection, AI ethics, institutional authority, teacher development, and digital infrastructure interact within Indonesia's evolving policy architecture. The Uzbekistan-focused contribution by Uteulieva and Otepbergenov (2026) likewise broadens the discussion from classroom-level applications to national and institutional conditions for AI integration.

These studies suggest that the key question is not simply whether regulation or strategy exists. It is whether responsibilities are clear, resources are available, implementation actors understand the policy, institutions coordinate effectively, and

progress can be monitored. Formal institutional plurality should not automatically be interpreted as implementation failure; where coordination mechanisms already exist, the relevant research question is how effectively they are operationalized. This distinction is likely to become increasingly important as national AI policy becomes more complex.

Teachers and Institutional Capacity

Across the Special Issue, teachers remain central to responsible implementation. They emerge as mediators of AI-supported learning, designers of meaningful tasks, evaluators of outputs, and guardians of academic integrity, privacy, and critical judgment. This means that teacher capacity is both a pedagogical and a governance issue.

Professional development should therefore move beyond basic tool training. It needs to include AI literacy, verification of generated content, assessment design, ethical and privacy considerations, classroom management, and critical evaluation. The quality of educational AI implementation may depend less on technological sophistication alone than on the capacity of educators and institutions to use technology purposefully and responsibly.

Methodological Lessons Across the Special Issue

The rapid development of educational AI creates understandable pressure to generate and publish evidence quickly. The studies in this Special Issue also reinforce the importance of aligning claims with research design. Descriptive post-intervention outcomes, correlational relationships, detector scores, bibliometric centrality, engagement percentages, and policy documents each support different kinds of inference. Their interpretation should remain proportionate to what the underlying design can establish.

Reproducibility is equally important in fast-moving fields. Search queries, coding procedures, scoring formulas, statistical models, software settings, and intervention details should be documented sufficiently for independent interpretation. Mixed-method studies benefit from explicit integration of qualitative and quantitative evidence, while documentary and bibliometric work requires transparency about source selection, screening, coding, and analytical parameters. These principles are not obstacles to innovation; they help distinguish technological enthusiasm from reliable educational knowledge.

Responsible Optimism and a Future Research Agenda

Taken together, the Special Issue supports a position that may be described as responsible optimism: openness to educational innovation combined with methodological caution, human oversight, equity, and institutional safeguards. AI offers real possibilities for expanding educational resources, supporting teachers,

creating new learning environments, and increasing access to information. At the same time, its educational value cannot be separated from human judgment, pedagogical design, institutional capacity, digital equity, ethical safeguards, and evidence quality.

Future research should move toward clearly specified educational uses of AI and observable definitions of AI literacy. More evidence is needed from underrepresented settings, including remote, rural, island, multilingual, and resource-constrained environments. Studies of AI-supported teaching should examine the quality of learning processes rather than tool use alone, while governance research should connect formal policy structures with implementation evidence from schools, teachers, administrators, students, and local authorities. Research on automated educational judgment should continue to examine reliability, fairness, transparency, and the consequences of error.

Conclusion

The Special Issue demonstrates that artificial intelligence in education should no longer be treated as a narrow technological topic. It is simultaneously a question of pedagogy, literacy, governance, equity, professional practice, ethics, infrastructure, and institutional design. Its most important collective contribution lies in bringing these dimensions together across diverse educational and national contexts.

The future of AI in education will not be determined by technological capability alone. It will depend on whether educational systems can integrate AI in ways that strengthen rather than weaken human judgment, expand rather than reproduce inequality, and support rather than replace meaningful teaching and learning.

Under what educational, ethical, institutional, and social conditions should AI be used, and how can those conditions be created and sustained?

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