Journal of Education and Educational Research
ISSN: 2957-9465 | Vol. 14, No. 2, 2025

Global Education Reform Driven by Intelligent Technology: Integration of Artificial Intelligence, Teaching Reconstruction and Fair Governance

Jingcheng Zhang

School of Management, Tianjin University of Technology, Tianjin, China

Abstract: Based on the global development trends of smart education in 2025, this article systematically analyzes the educational transformation path, practical predicaments and governance paradigms driven by artificial intelligence technology. Research shows that the deep integration of AI and education and teaching is promoting the formation of a "teacher-student-machine" trinity collaborative model, achieving breakthroughs in personalized courses, intelligent management, and comprehensive evaluation. However, it also faces core issues such as insufficient adaptability of teachers, lack of technical ethics, and challenges to educational equity. This article proposes that to build a "people-oriented" intelligent education ecosystem, the goal of high-quality education development should be achieved through the development of low-threshold technologies, the cultivation of teachers' intelligent literacy, the establishment of a flexible governance framework, and the promotion of evidence-based teaching practices. The research integrates comprehensive policy analysis, case comparisons and empirical data to provide theoretical references and practical paths for the global digitalization strategy of education.

Keywords: Educational Reform; Artificial Intelligence Education; Smart Education; Educational Equity; Teacher Development.

1. Research Purpose and Significance

In 2025, when artificial intelligence technology is experiencing explosive growth, the global education system is at a historical turning point of intelligent transformation. China's "White Paper on Smart Education" defines 2025 as the "first year of Smart Education", marking a new stage in the transformation of education from information-based assistance to intelligent reshaping. Against this backdrop, this study aims to clarify three core issues: First, how can intelligent technologies restructure the teaching process and educational ecosystem; The second is the structural contradictions and governance challenges in the global digitalization practice of education; The third is how to establish a new model for educational development that takes into account both efficiency and fairness.

At the theoretical level, the research breaks through the limitations of the traditional "technological tool theory" and analyzes the cognitive mechanism of human-machine collaboration from the perspective of educational ontology. In its 2025 report "Unlocking High-Quality Teaching", the OECD pointed out that teaching is shifting from "revealing 'what makes a good class' based on teachers' behavior" to "guiding 'how to implement a good class' based on evidence", which means that understanding the essence of teaching requires the integration of scientific evidence and teachers' professional wisdom. At the practical level, research provides a path to solve the triangular problem of "personalization, high quality and large scale" in education. The registered users of China's National Smart Education Platform have exceeded 164 million, covering over 220 countries and regions, making it the world's largest digital center for educational resources and providing ample practical samples for research. At the policy level, research responds to the goals of the United Nations' Global Digital Compact and provides an implementation framework for the Education Digitalization Strategy Action 2.0. The "National Education Digitalization Strategy Action 2.0" initiated by the Ministry of Education of China marks a new stage in the digital transformation of China's education, which urgently requires systematic theoretical guidance.

2. Analysis of Current Research Status

2.1. The Global Policy Layout is Accelerating

The year 2025 will be a crucial one for the implementation of smart education policies. The Ministry of Education of China and nine other departments jointly issued the "Opinions on Accelerating the Digitalization of Education", which for the first time systematically defined the technical path for the integration of AI and education, and required the integration of artificial intelligence technology into the entire process of education and teaching. Local governments have responded promptly. For instance, Xi 'an has launched a special campaign for artificial intelligence education in primary and secondary schools, aiming to achieve a coverage rate of over 70% for artificial intelligence education courses in all primary and secondary schools by 2027, with no less than 8 class hours per academic year. Guangdong Province has launched the "Two Competencies and One Outline" program, establishing the country's first provincial-level AI literacy framework for teachers and students. International policies are polarized: 19 states in the United States have filed lawsuits against the Trump administration for cutting funds for DEI (Diversity, Equality and Inclusion) programs, opposing federal intervention in local educational equity policies. During the implementation of South Africa's BELA Act, the definition of "student community" was controversial, and it was criticized for covertly safeguarding the educational privileges left over from apartheid.

2.2. The Application Scenarios of Technology have been Deepened

Artificial intelligence technology has permeated the entire education chain, forming six major application scenarios: teaching assistance, student assistance, evaluation assistance, education assistance, research assistance, and management assistance. In the field of teaching assistants, the intelligent lesson preparation system enables the automatic generation of teaching plans. Teachers can take photos and upload the questions to obtain the correction results and teaching plan designs, significantly saving mechanical work time. In the field of student assistance, the adaptive learning system has achieved remarkable results. After a certain middle school adopted the intelligent question-answering system, the resolution rate of students' after-class problems increased by 100%. In the field of evaluation, multimodal learning analysis has become a trend. The "five-education portrait" technology based on voice, video and motion capture has begun to be piloted, but the measurement model still needs to be improved.

Table 1. Analysis of the Maturity of Smart Education Technology Applications in 2025

Application level	Technical representative	Maturity	Typical cases
Classroom teaching	Smart pen and paper system, AI learning machine	Comprehensive promotion	143 primary and secondary schools in Minhang District, Shanghai, have adopted the "Smart Pen and Paper +AI" system to achieve contactless data collection
Teacher development	Digital avatars, AI teaching and research assistants	Partial pilot	Teachers at Tianjin University have produced over 100,000 course videos using digital avatar technology
Educational governance	Data cockpit, degree prediction	Preliminary application	The "Songhui Homework" project in Songjiang District has narrowed the gap in the average mathematics scores between urban and rural areas
Learning ecology	VR laboratory, metaverse classroom	Proof of concept	New Oriental's "Tiangong Voyage" system simulates space missions through VR

2.3. Innovative Exploration of Teaching Paradigms

The global teaching reform shows the feature of "dual-track progress" : On the one hand, China has proposed the "teacher-student-machine" ternary collaborative model, reconstructing the classroom through modular course clusters and open assessment; On the other hand, the OECD advocates "Evidence-Based Teaching 2.0", and in its 2025 report "Unlocking High-Quality Teaching", it proposes 20 core practices, emphasizing the role of teachers as "knowledge discoverers" and elevating professional wisdom to an equal status with scientific evidence. [1] This transformation breaks through the traditional limitation of "relying solely on scientific evidence" and respects teachers' professional autonomy and creativity in the digital age. For instance, in the research on junior high school mathematics classrooms in Shanghai, it was found that the differences among teachers in the teaching dimension (such as classroom discourse and cognitive participation) were significantly higher than those in the classroom management dimension, which proved the irreplaceability of professional judgment in the teaching situation.

2.4. Challenges and Breakthroughs in Educational Equity

Although technology provides tools for resource balancing, institutional barriers still lead to the deepening of the digital divide. Developed countries have narrowed the gap through the popularization of AI education: for instance, Nanjing has invested 23 million yuan to equip 625 schools with standardized AI experimental instruments, achieving full coverage. Some countries, however, have exacerbated inequality due to policy implementation deviations: The Department of Education of South Africa has narrowed down the "Education Districts" in the BELA Act to "peripheral communities" (surrounding communities), effectively continuing the educational segregation of the apartheid period. The US federal government has cut the funding for DEI programs under the pretext of "anti-discrimination", threatened to cancel federal K-12 funding, and forced many schools to abandon assistance programs for vulnerable groups.

3. Existing Problems and Challenges

3.1. Educational Equity is at Risk of Technological Alienation

The promotion of intelligent educational technology was originally intended to facilitate resource balance, but in practice, it may exacerbate class solidification. The regional differences in hardware configuration have created the first gap: The precise teaching system jointly developed by ZunYi City and FLYTEK only covers key schools in the urban area, while rural schools have difficulty accessing it due to insufficient network bandwidth. Deviations in policy implementation have led to institutional exclusion. For instance, in South Africa, schools have restricted the admission of students from low-income families under the guise of "language preference", effectively safeguarding the interests of the privileged class. The deeper issue lies in the algorithmic bias of the data. The AI training data overly relies on samples of urban students, leading to the system misjudging the cognitive characteristics of rural students. For instance, a certain intelligent assessment system recognizes dialect speech as a pronunciation error, thereby reducing the language learning score [2]. These phenomena confirm the warning of the EDUCAUSE report: Insufficient inclusiveness of technology will lead to the Matthew effect in the distribution of educational resources.

3.2. Teachers' Adaptability Lags Behind Technological Iteration

Teachers' AI literacy has become a bottleneck restricting the effectiveness of the reform. Data from teacher training in Xi 'an shows that only 43% of teachers can independently operate AI teaching platforms, and the proportion for rural teachers is less than 20%. The root cause of the problem lies in three sets of contradictions: the first is the skill gap, the contradiction between the explosive growth of generative AI tools and the long training cycle for teachers. The development of teachers' capabilities requires systematic training, but the speed of technological iteration far exceeds the update frequency of the training system. The second issue is role conflict. After AI teaching assistants take over routine tasks such as lesson plan design and homework correction, teachers are faced with the anxiety of "transferring teaching dominance". The OECD report points out that excessive reliance on AI can lead to a weakening of teachers' professional judgment. Thirdly, there is a lack of incentives. Although the intelligent teaching and research system can offer suggestions for teaching improvement, it is not associated with professional title evaluation and performance rewards, resulting in insufficient application motivation.

3.3. The Technical Governance System is Still Not Well Established

The rapid development of artificial intelligence education has exposed governance blind spots, which are mainly reflected in three aspects: First, the lack of data security mechanisms. Educational large models need to collect sensitive data such as the biometric features and learning behaviors of teachers and students. However, the "Overall Reference Framework for Educational Large Models" only preliminarily defines the copyright of the generated content and has not established a full-process privacy protection standard. The second issue is the insufficient transparency of the algorithm. [3] Although the ANFIS teacher evaluation model has high accuracy, the parameter optimization process has a "black box" feature, and the evaluated teachers have reasonable doubts about the results. The third issue is the ambiguity of the regulatory responsibility subject. When the AI correction system misjudges compositions, causing damage to students' rights and interests, it is difficult to define the person responsible (developers, schools or teachers). These issues reflect the call of the EDUCAUSE report: there is an urgent need to establish an AI governance framework for cross-departmental collaboration.

3.4. The Evaluation Reform has Encountered Path Dependence

Although technology makes comprehensive evaluation possible, practice is still constrained by traditional thinking. In terms of evaluation content, the concept of "five-education integration" is limited by the lack of quantifiable indicators. Most schools simplify physical education and aesthetic education to mechanical data such as the number of rope jumps and the number of paintings, neglecting the cultivation of core literacy. In terms of evaluation methods, the usage rate of new tools such as electronic portfolios and block chain certificates is less than 12%, while traditional examination scores still hold a dominant weight [4]. In terms of the evaluation subject, AI-driven automated assessment squeezes the space for students' independent reflection. After a certain school introduced an AI moral education scoring system, students performed "moral shows" to improve their scores, which instead weakened the cultivation of true character. [5]

4. Conclusion and Suggestions

4.1. Developing Low-threshold Educational AI

Hardware light weighting: Promote low-power devices like Huawei Cloudlink C5e tablet to adapt to rural school network environments

Algorithm inclusiveness: Add dialect and disabled student samples to the training dataset to eliminate digital identity discrimination

Resource sharing: Building urban-rural AI education communities, such as the "Urban-Rural AI Education Community" model in Xi 'an

4.2. Building Dual-Track Capabilities of "Human Intelligence + Artificial Intelligence"

Role repositioning: Transforming from a knowledge transmitter to a learning guide and AI supervisor, strengthening emotional education and the cultivation of critical thinking

Systematization of training: Establish a three-level training course of "tool application - ethical judgment - innovative design" and incorporate it into the continuing education credits

Incentive mechanism: Incorporate AI teaching capabilities into the standards for professional title evaluation and establish a smart education innovation reward fund

4.3. Establish a Flexible Regulatory Framework

Security boundary: In accordance with the "Overall Reference Framework for Educational Large Models", clearly define the copyright ownership of the generated content and the boundaries of data usage

Transparent mechanism: Publicize the evaluation dimensions of educational algorithms (such as the 12 parameters for essay correction), and accept inquiries and supervision from educators

Multi-party governance: Establish an AI ethics committee involving teachers, developers, and legal experts to conduct annual compliance reviews

4.4. Develop Evidence-Based Education Practices

Integrating scientific evidence with professional wisdom: Drawing on the core practice guidelines of the OECD, optimize teaching based on classroom evidence rather than mechanically implementing standardized processes

Multimodal evaluation: Integrate process data such as VR experiment records and collaborative learning logs to construct a dynamic model of "five-education portrait"

Student subjectivity: Add an autonomous learning and reflection module to the AI evaluation system to balance technical assessment with the all-round development of individuals

The digital transformation of education is by no means a simple transplantation of technology, but a profound reconstruction of the essence of education. As advocated in China's "White Paper on Smart Education", future education

should be based on the "new stage, new standards, new paths" (3N principle), and achieve the organic unity of large-scale education and personalized cultivation through technological empowerment. Only by adhering to the bottom-line ethics of "educating people first, then discussing efficiency" can we ride the technological wave without losing the essence of education and ultimately build a new global education ecosystem that is fair, efficient and sustainable.

References

[1] EDUCAUSE. 2025 Horizon Report (Teaching and Learning Edition) [R]. United States: EDUCAUSE, 2025.

[2] Ministry of Education of China. White Paper on Smart Education in China [R]. Beijing: Ministry of Education of the People's Republic of China, 2025.

[3] National Institute of Education Sciences, China Global Digital Education Development Index 2025[R]. Beijing: National Institute of Education Sciences, China, 2025.

[4] The Research Group of "Frontiers of Digital Education" Top 10 Global Hotspots in Digital Education Research [R]. Beijing: Frontiers of Digital Education Journal, 2025.

[5] Standardization Committee of the World Digital Education Alliance Overall Reference Framework for Large Educational Models [S]. Beijing: World Digital Education Conference, 2025..