

The Construction Path and Future Trend of AI Enabled Education Ecology from the Perspective of Human-Computer Cooperation

Leina Zheng¹, Yongsheng Gao^{2,*}, Yuting Yang³, Tiejun Pan⁴

¹Business School, Zhejiang Wanli University, Ningbo, Zhejiang, China

²School of Mechanical Engineering and Automation, College of Science & Technology Ningbo University, Ningbo, Zhejiang, China

³College of Teacher Education, Ningbo University, Ningbo, Zhejiang, China

⁴School of Information Engineering, College of Science & Technology Ningbo University, Ningbo, Zhejiang, China

*Corresponding Author

Abstract: The current development of artificial intelligence is particularly rapid. In order to explore the comprehensive impact of artificial intelligence (AI) on educational reform, this article systematically analyzes the theoretical basis, technical models, application status, and challenges faced by AI empowered education, and looks forward to future development trends. Starting from the constructivist and connectivist theories of educational reform, combined with the TPACK (Technological Pedagogical Content Knowledge) framework and SAMR (Substitution, Augmentation, Modification and Redefinition) model, this article elaborates on how AI can empower the entire education chain ecosystem, promote personalized learning, and enhance teaching effectiveness. At the same time, it points out the multidimensional challenges faced by current AI education, such as data privacy, algorithm bias, and teacher role reshaping, and proposes the construction of a "technology teaching ethics" three-dimensional collaborative development model. In the future, AI education will focus on building an intelligent education ecosystem, deepening human-machine collaboration, and promoting educational equity. It emphasizes the "AI+teacher" collaboration model and the improvement of ethical regulations to promote inclusive, innovative, and sustainable education ecosystem construction, providing theoretical and practical inspiration for educational ecosystem transformation.

Educational Reform; Personalized Learning; Educational Ethics; Teacher Development

1. Introduction

The rapid development of artificial intelligence is deeply reconstructing all fields of human society, and education bears the brunt. The deep integration of AI and education has become a key dimension of the evolution of global education, which systematically drives the all-round reform of education form, teaching mode and learning paradigm. From the macro level to explore the ethical dilemma and governance path of AI education, to the in-depth analysis of the core logic of human-computer cooperation, the educational reform, and to the forward-looking policy guidance document issued by UNESCO, relevant research and practice activities have highlighted the strategic value and far-reaching impact of AI in the field of education. The continuous iteration of technology provides support for education reform, data-driven reshapes the education path, lays the foundation for human-computer collaborative teaching, and promotes the evolution of teaching in the direction of diversification and intelligence. The construction of evidence-based teaching evaluation system provides a scientific basis for improving the quality of education. At the same time, the new challenges brought by man-machine collaborative teaching also urge educators to constantly explore teaching methods and strategies to meet the needs of the times.

2. Theoretical Foundations and Technological Models of AI in Education

Keywords: Artificial Intelligence;

2.1 Educational Transformation Theories

Constructivism: it emphasizes that learners actively construct knowledge based on experience. AI supports learners' independent exploration and knowledge construction based on cognitive structure and learning style by providing personalized learning environment and resources (such as dynamic adjustment of content by intelligent tutoring system).

Connectionism: knowledge is regarded as a distributed network, and learning is to connect nodes. AI breaks the resource boundary, connects information and scenarios (such as online platform AI recommends cross domain resources), promotes knowledge flow and sharing, and deepens understanding and application.

2.2 Technology-Enabled Educational Models

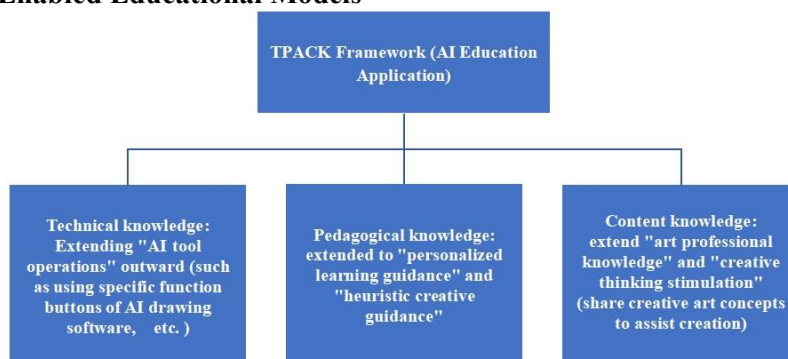


Figure 1. TPACK Framework

Samr model: as shown in Figure 2, the samr model includes four levels: substitution, augmentation, modification and redefinition. AI education applications can run through all levels, from replacing traditional tools (such as AI

TPACK framework: as shown in Figure 1, TPACK framework integrates technical knowledge (TK), pedagogical knowledge (PK), subject content knowledge (CK) and their composite knowledge (PCK, TCK, TPK, TPACK). The framework emphasizes the role of teachers as participants, designers and implementers in the technological environment, pays attention to the deep integration of three kinds of knowledge rather than simple superposition, and acknowledges its "ill structured" characteristics (i.e., involving multiple factors and complex interactions). In AI education, teachers need to master AI characteristics and combine appropriate teaching methods and subject content (such as using AI painting tools to teach art creation) [1].

correcting homework) to reconstructing learning experience (such as AI virtual experiment platform supporting high-risk or high-cost experiments) [2].

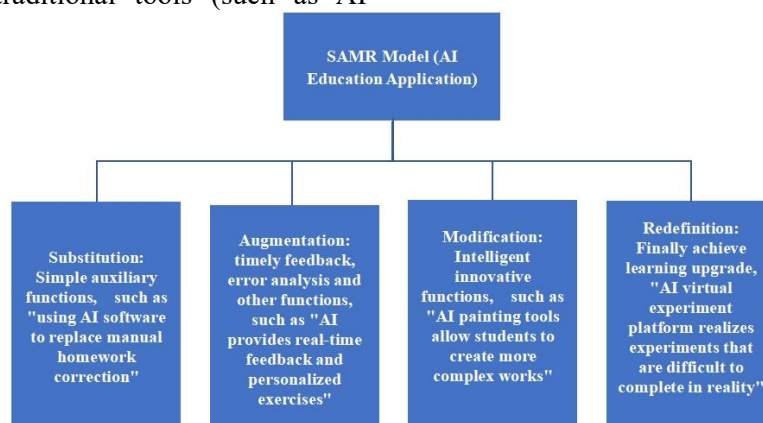


Figure 2. SAMR Model

2.3 Ethical Guidelines for AI in Education

Child data protection: child data has special sensitivity and needs to be strictly protected. Clarify data collection, storage and use rights,

and use encryption technology to ensure data security. If kindergartens use AI system to record children's performance in kindergartens, parents' consent should be obtained and it should only be used for educational care

purposes to prevent data leakage from endangering children's safety [3].

Algorithm fairness: ensure that AI algorithms are non discriminatory and treat all learners fairly. Pay attention to the diversity and quality of training data to avoid algorithm bias caused by data deviation. For example, in the resource recommendation algorithm, comprehensive consideration is given to the needs of students from different regions, genders and cultural backgrounds, so as to ensure the fair distribution of resources and enable every student to benefit from AI education.

3. AI-Driven Structural Transformation of Education and Teacher Role Redefinition

The deep integration of artificial intelligence is

reshaping the whole chain ecology of education. Its application has covered all stages of education from preschool to vocational training, forming a multi-dimensional and hierarchical development pattern. AI technology provides precise support for students of different ages and learning needs through innovative forms such as personalized learning solutions, intelligent tutoring systems, and virtual training platforms. The following table systematically summarizes the typical application scenarios, actual achievements and existing challenges of AI in preschool education, k12 education, higher education and vocational training, and reveals the differentiated characteristics and development potential of technology enabled education.

Table 1. Analysis of AI Application Efficacy and Challenges across Educational Stages

Stage	AI Focus	Applications	Efficacy	Limitations
Preschool	Engagement, Interaction, Personalized Support	Personalized learning plans, Resource recommendation, Immersive experiences, Educational robots, Developmental assessment, Reporting assistance, Classroom management	Enhanced interest, Personalized interaction, Teacher assistance, Improved home-school collaboration	Limited case generalizability, Insufficient equity discussion, Over-reliance risk, Content appropriateness, Need for teacher AI literacy, Privacy concerns
K-12	Intelligent Tutoring, Adaptive Learning, Assessment	Intelligent tutoring systems, Adaptive exercises, Classroom behavior analysis, AI labs, VR classrooms, AI courses	Improved learning efficiency, Reduced teacher workload, Resource enrichment	Neglect of cognitive stage differences, Lack of detailed case evaluation, Algorithm generalizability, Data privacy
Higher Ed.	Teaching Assistance, Research Support, Customized Services	Smart learning platforms, Virtual mentors, AI video production, AI study rooms, Career navigation	Enhanced learning efficiency, Shared quality resources, Research support, Career planning	Questionable case generalizability, Immature system development, Uncertain adaptability
Vocational	Skill Enhancement, Personalized Pathway Recommendation	Virtual training platforms, Adaptive learning platforms, AI career navigation	Improved practical skills, Shortened transition cycles, Higher job matching	Relatively few case studies, Unverified general effectiveness

It can be seen from table 1 that the integration of artificial intelligence is fundamentally reshaping the global education pattern, promoting the transformation of the education paradigm from the traditional "one thousand faces" mode to student-centered personalized learning, and realizing the educational ideal of "one thousand faces for one person". This change makes the educational environment more scalable, personalized and adaptive. The purpose is to improve the quality of education, promote educational equity, provide diversified and efficient learning modes, so as to change the traditional teaching methods, reconstruct the teaching scene, and put forward new

requirements for the role of teachers. From immersive interaction in preschool to intelligent research support in higher education, the deep penetration of AI technology is deconstructing the traditional positioning of "knowledge imparter", and promoting the transformation of teachers' functions to a more creative and humanistic dimension. This change is by no means a simple tool replacement, but a systematic reshaping of the relationship between education subjects. When AI undertakes the standardized functions of knowledge transfer and behavior analysis, teachers can turn their core energy to high-level fields such as emotional cultivation and value guidance that

cannot be replaced by machines.

Table 2. Teacher Role Redefinition and Core Function Shifts under AI Empowerment

Traditional Role	AI-Empowered Role	Core Functional Shift
Knowledge Transmitter	Learning Guide&Facilitator	Shift from "teaching knowledge" to "guiding learning, "focusing on cognitive development and autonomous inquiry
Curriculum Developer	Curriculum Designer & Environment Architect	Utilizing AI to design creative, personalized learning activities and scenarios
Classroom Manager	Technology Coordinator&Data Analyst	Mastering AI tools, managing virtual/hybrid environments, leveraging data insights for instructional decisions
Evaluator	High-Order Assessor & Potential Identifier	Employing AI data for comprehensive, dynamic assessment, focusing on non-cognitive skills, identifying and nurturing potential
Sole Knowledge Authority	Emotional Supporter&Value Leader	Investing energy in emotional care, interpersonal interaction, values education, ensuring technology serves educational essence
Repetitive Task Performer	Efficiency Enhancer & Creativity Unleasher	Delegating repetitive tasks to AI, freeing time for challenging, creative instructional design and personalized guidance

As shown in Table 2, this transformation is embodied in the upgrading of roles in six dimensions: after AI handles repetitive tasks such as homework grading, teachers are upgraded from "classroom manager" to "technical coordinator"; When the intelligent system completes the analysis of learning data, teachers are transformed into "potential recognizers". It is worth noting that this role evolution has significant stage characteristics - the basic education stage emphasizes the "complementary collaboration" between AI and teachers, while higher education focuses on "research collaboration". This difference just confirms the division of AI application focus in different education stages in Table 1, and together forms a complete change chain of "technology empowerment - role reconstruction - education innovation".

With the addition of AI, the educational structure has evolved from the traditional "teacher student" binary model to a more complex "teacher machine student" ternary model. Under this new structure, AI is no longer just a carrier of knowledge, but a third-party force involved in teaching and learning, forming a collaborative relationship with teachers and students [4]. Intelligent tutoring system and personalized recommendation system have become important learning support and teaching aids [5]. However, the specific operation mechanism of this "teacher machine student" ternary structure, how to effectively coordinate man-machine and the resulting deep impact are still areas that need to be further explored in current research [6]. Driven by AI technology, the role of teachers is undergoing a profound transformation. In the blue book on the application of AI enabled basic education, it is also proposed that teachers are changing from

traditional knowledge imparters to learning guides, curriculum designers, technology coordinators and high-level evaluators. With the help of AI technology, teachers are creating a personalized learning environment for students, designing innovative courses, managing the human-computer cooperation process, and implementing comprehensive assessment. At the same time, teachers also need to improve their AI literacy to better integrate intelligent technology into teaching practice [7].

4. Multidimensional Analysis of Challenges in AI Education Applications

Although AI empowerment education has broad prospects, it faces many challenges. Technically, data privacy and security risks, algorithm bias and black box problems need to be solved; In terms of educational practice, the role of teachers needs to be transformed, the popularization of technology is uneven and there is a risk of excessive dependence; At the ethical level, the application of technology is easy to deviate from the essence of education, and the existing evaluation system is difficult to comprehensively evaluate students' ability. Build a three-dimensional collaborative development model of "technology teaching ethics", emphasize the adaptation of technology to the educational environment, empower learners' cognitive and social development, and embed ethical considerations to ensure that technology application is compliant and serves the essential goal of education.

4.1 Technical Challenges

AI education applications face data privacy and security issues. To build a personalized learning model, it is necessary to collect a large number of students' personal information and learning

behavior data. These data have potential risks of disclosure and abuse, which will seriously threaten students' privacy and security. The deviation of training data or algorithm design in AI system may lead to algorithm bias, resulting in unfair treatment of specific student groups by AI, thus aggravating the unfair phenomenon of education. Many advanced AI algorithms are regarded as "black boxes". Their internal decision-making process is opaque, and there are problems of insufficient algorithm interpretability. It is difficult to explain the reasons why AI makes specific recommendations or evaluations to teachers, students or parents, which reduces the credibility of the system and hinders users' understanding and trust in AI decisions [5].

4.2 Educational Practice Challenges

The popularity of AI has brought fundamental changes and challenges to the role of teachers. Teachers need to change from traditional knowledge imparters to learning guides, promoters, curriculum designers and environment creators, which puts forward higher requirements for teachers' professional quality and teaching ability. The popularization of AI technology is faced with the problems of high technology threshold, high cost, weak infrastructure and unequal regional resources, which may lead to the unbalanced application of technology and further aggravate the inequity of education. Students' and teachers' excessive dependence on AI may lead to students' mental inertia, limited autonomy and creativity, reduced real interaction and emotional connection between teachers and students, and affect the development of students' social emotional ability [8].

4.3 Ethical Challenges

Technology driven may squeeze interpersonal communication space, ignore emotional and humanistic elements, affect students' social emotional development, and deviate from the essential goal of education. The existing evaluation system is difficult to

comprehensively evaluate students' performance in the AI environment, such as high-level thinking, cooperation ability, etc., and can not accurately reflect students' ability, which will affect teaching improvement and talent training [9].

In order to meet the above multi-dimensional challenges, it is urgent to build a three-dimensional collaborative development model of "technology teaching ethics". The model emphasizes the adaptability of technology to the specific educational environment, empowers learners' cognitive and social development, and embeds ethical considerations into the whole process of technology development and application to ensure its compliance and serve the essential goal of education.

5. Future Development Trends and Construction Strategies for AI in Education

Artificial intelligence technology is profoundly reshaping the future of education, and its development trend is characterized by systematization, integration and humanism. With the further promotion of digital transformation of education, the integration of AI and education will upgrade from the application of tools to the reconstruction of ecosystem, and promote the overall reform of education mode, resource allocation and evaluation system. In this process, intelligent technology will not only optimize teaching efficiency, but also redefine the realization path of learning experience and educational equity. The following table systematically presents the future development direction of AI enabled education from six key dimensions, including the construction of intelligent education ecosystem, the deep integration of AI and education, the promotion of education equity and other core areas, and elaborates the specific characteristics of each trend and its strategic significance for education development.

As shown in Table 3, the multidimensional development trend of AI education in the future presents six directions.

Table 3. Multidimensional Strategic Framework for Future Trends in AI Education

Trend Direction	Key Content&Characteristics	Impact/Objective
Intelligent Educational Ecosystem Construction	Integrate resources&tech: Smart platforms, resource libraries, training systems, evaluation systems. Explore educational metaverse, digital twins. Build home-school-community AI networks	Break spatial limits, optimize resource sharing, enable precise diagnosis/intervention, drive data-based decisions, ensure seamless connection

AI-Education Deep Integration	Innovate pedagogy (e.g., PBL), develop smart courseware, pioneer new evaluations. Implement "N+X" curricula. Enable career propensity prediction/path planning	Enhance learning capacity, solve difficulties, ignite motivation, foster innovation, cultivate future-ready talent
Promoting Equity&Balance	Use online platforms/AI systems to reach underserved areas. Leverage policy/funding support. Develop low-cost solutions. Assist special needs students	Bridge digital divide, reduce disparities, universalize resources, protect vulnerable groups
Deepening Personalized Learning	Refine analysis of learner traits/needs. Deliver tailored solutions. Enhance immersive interaction (VR/AR). Advance intelligent home-school collaboration	Boost learning efficiency/experience, accommodate individual differences, promote holistic development
"AI+Teacher" Collaboration Model	Teacher roles evolve (Guide/Emotional Support/Coordinator). AI acts as smart assistant. Foster efficient human-AI synergy. Explore "Teacher-AI-Student" models	Reduce teacher burden, free time for higher-value tasks, enhance teaching quality, integrate humanistic care with technology. Teacher upskilling vital
Ethical&Regulatory Refinement	Strengthen research/regulations for AI application. Define norms for privacy, bias, fairness, transparency. Safeguard child autonomy/creativity	Ensure healthy sustainable development, align technology with educational essence, achieve fair, high-quality education

5.1 Intelligent Ecosystem Construction

The construction of intelligent education ecosystem will be committed to the integration of educational resources and technology, and the sharing and optimal allocation of resources. This includes the construction of an intelligent education platform, a rich resource library, a perfect teacher training system and a scientific student evaluation system, in order to break through the limitations of physical space, realize the extension of educational value, and form a closed loop with the cloud teaching and research system to support educators' accurate diagnosis and dynamic intervention. Some solutions have listed the exploration of "educational meta universe" (such as building a virtual campus and a digital twin classroom) and AI personalized learning engine (dynamically generating learning paths based on student behavior data) as the pre research direction of future educational technology. The construction of AI education network covering "family school community" is regarded as an important direction of intelligent education ecological construction, aiming to realize the seamless connection of educational resources. At the same time, data-driven decision-making will replace experience driven decision-making to optimize the allocation of educational resources and student development planning [10].

5.2 Deep AI-Education Integration

The deep integration of AI and education will produce innovative applications in teaching

mode, curriculum system and personnel training. This includes exploring the combination of AI, project-based learning, inquiry learning and other teaching modes, and developing intelligent textbooks, intelligent courseware and new education evaluation methods to achieve a more comprehensive and objective evaluation. The curriculum system will put more emphasis on adapting to future development, encouraging students to cross-border study and explore unknown fields, such as providing rich personalized curriculum choices through the "n+x" mode. Talent cultivation will focus on the construction of students' core literacy, and use AI to predict career orientation and plan development path. The ultimate goal is to cultivate new talents with digital viability and innovative genes.

5.3 Promoting Equity

AI is expected to significantly promote education equity and balanced development by breaking geographical and resource constraints. Through the online education platform and intelligent teaching system, high-quality educational resources can cover remote areas and schools with weak educational resources, so as to narrow the education gap between urban and rural areas and regions. The policy guidance and financial support of the government and the education sector, especially the support for weak areas, and the encouragement of enterprises to develop low-cost and easy-to-use products will help reduce the threshold of technology application and ensure that students in different

regions can enjoy the educational advantages brought by AI. AI also shows the potential to promote equity in assisting students with special needs [11].

5.4 Advanced Personalization

Looking forward to personalized learning, it will be more in-depth and accurate, which can more accurately analyze children's learning characteristics and needs, and provide customized education programs. The interactive experience will be more rich and immersive. With the help of VR, AR and other technologies, it will provide a more vivid and interesting learning experience. Home co education will also be more intelligent and convenient, and promote in-depth communication and cooperation between home and school through the intelligent platform. In the field of preschool education, the application of AI will continue to deepen in the future. With the continuous improvement of teachers' professional quality, it is committed to empowering children's growth and making smart education illuminate the road of childhood.

5.5 "AI+Teacher" Collaboration

Future education emphasizes the importance of "ai+teacher" cooperation mode. The role of teachers will change from a simple knowledge imparter to a learning guide, emotional supporter and technical coordinator, paying more attention to the combination of "humanization" and "creativity". AI will act as an intelligent assistant for teachers to assist in teaching, evaluation and management, form an efficient human-computer cooperation mode, free teachers from repetitive work, and enable them to put more energy into warm interaction with students. It is an important direction for future development to explore the new teaching mode under the "teacher machine student" ternary structure and find the best combination point. It is very important to improve teachers' digital literacy and professional ability with "educational sensitivity" as the core [12].

5.6 Ethical-Regulatory Advancement

The improvement of AI education ethics and regulations is the cornerstone to ensure the healthy and sustainable development of AI education. In the future, we need to strengthen research and formulate relevant laws and regulations, standardize the application of AI in

education, and clarify ethical principles and legal norms such as data privacy protection, algorithm transparency and fairness. Especially in preschool education, we must be alert to the potential risks of AI, and take the protection of children's independent exploration and creativity as the core responsibility. It is essential to promote the balance between humanistic care and technical rationality and ensure that AI serves the educational goal of "early childhood development oriented". Future development needs to continue to focus on data privacy and security to ensure the sustainability and security of technology.

Although generally optimistic about the future prospects, the realization of these visions still faces uncertainties and challenges of technological development. For example, more advanced AI models, more natural interaction methods, breakthroughs in emotional computing, and the deep integration of AI with other disciplines such as brain science still need to be further explored. In addition, the construction of a sound ethical and regulatory framework, the exploration of localized practice paths in different cultural contexts, and the solution of technology costs, ensuring the balance between technological convenience and educational trial and error are all the key points that future research and practice need to continue to focus on. Finally, the future of AI enabled education needs the joint efforts of educators, technology developers and policy makers.

6. IPE Based on LLM

As a specialized and value-laden educational domain, Ideological and Political Education (IPE) faces unique challenges and opportunities in the era of artificial intelligence. Large-scale AI models (e.g., GPT-4, ERNIE, or other foundational models) bring new possibilities for content generation, contextual understanding, and interactive dialogue, making them particularly suitable for supporting and innovating IPE. The mechanism of empowerment lies in several key aspects:

First, large models can perform in-depth semantic analysis and knowledge integration of massive texts, policy documents, and historical cases related to IPE, constructing a structured and multimodal knowledge graph that supports intelligent Q&A, scenario simulation, and dialectical discussion.

Second, leveraging powerful natural language

generation and dialogue capabilities, large models can act as "virtual teaching assistants," providing students with personalized and interactive theoretical learning guidance, such as explaining difficult theoretical points, generating debate scenarios, and simulating public opinion responses, thereby enhancing the Inspirational and engaging of IPE courses.

Third, through affective computing and learner profiling analysis, large models can identify students' emotional tendencies and cognitive preferences, assisting teachers in implementing precise ideological education and psychological counseling, achieving a combination of "teaching students according to their aptitude" and "value guidance".

However, the practical deployment of large models in IPE must be carefully designed to avoid technological determinism or decontextualized application. We propose a three-layer implementation framework:

Resource Layer: Develop a specialized large model and corpus for IPE that integrates policy, theory, history, and cultural elements, strengthening the model's understanding and expression of the Chinese context and socialist core values.

Teaching Layer: Explore a "teacher-large model-student" triadic collaborative teaching model. Teachers, as the leaders, design topics, organize interactions, and steer the educational direction; large models handle knowledge retrieval, content generation, and preliminary Q&A; students deepen their critical thinking and value identification through dialogue with the machine.

Ethics and Evaluation Layer: Establish a compliance review and value alignment mechanism for AI applications in IPE, ensuring the political, ideological, and scientific correctness of generated content. Simultaneously, construct a multidimensional evaluation system covering cognitive, affective, and behavioral performance to prevent superficial application of technology.

Future research should focus on building a domain-specific large model for IPE, enhancing the interpretability and controllability of AI-generated content, and strengthening teachers' AI literacy to lead value-based dialogue in smart learning environments. This expansion not only enriches the application of AI in specialized education but also provides a typical case of human-computer collaboration

under the goal of "fostering virtue through education".

7. Conclusion

AI enabled education reform is imperative, and building a human-computer collaborative intelligent education ecosystem is an important development direction in the future. The human-computer cooperation mode gives full play to the technical advantages of AI and the humanistic care advantages of teachers. AI is good at data analysis, personalized recommendation and automatic task processing, while teachers can provide emotional support, value guidance, creative teaching design, dynamic teaching decision-making and grasp of educational ethics, emphasizing that technology should serve the educational essence of "human awakening". Especially in the stage of pre-school education that attaches importance to emotional development, the emotional connection between teachers and students is the core element that AI cannot replace. Human computer collaboration requires teachers to shift from skill based to value based paradigm, and cultivate core competitiveness beyond technical tools. However, how to achieve the optimal human-computer cooperation mode and ensure the leading role of people and the maintenance of emotional communication still need more in-depth exploration and practice.

AI technology enables online education platforms and remote interactive tools to show great potential in promoting the equitable distribution of educational resources, which is expected to break the geographical and resource constraints, so that all students can consult the best "tutors" one-to-one at any time, or effectively bridge the gap between urban and rural and regional educational resources and promote the inclusive practice of educational equity by providing high-quality online educational resources. Through "technological equality", we can provide suitable educational resources and personalized support for students from different backgrounds, so as to promote educational equity. At the same time, we also need to pay attention to the risk that AI may exacerbate injustice, such as the digital divide. We need policy preferences and specific strategies to ensure that technology truly benefits all learners, systematically achieve the goal of educational equity, and address potential challenges, which requires more in-depth

analysis and practical exploration.

Acknowledgements

The paper is supported by the National Social Science Fund of China (Grant No. 24VSZ094).

References

- [1] Wu Lianghui, Li Yuzhu, Wu Xiaoqian. Development of AI Teaching Tools Based on the TPACK Framework. *Curriculum and Teaching Studies*, 2025, (04): 59-64.
- [2] Tian Chun, Wang Chaohui. The Value, Risks, and Mitigation Strategies of Student Agency Development under the SAMR Model. *Journal of Inner Mongolia Normal University (Educational Science Edition)*, 2025, 38(01): 56-63+70.
- [3] Jiang Shengli, Dai Yuan. Constructing Age-Appropriate Protection Rules for Children's Data. *Human Rights Law*, 2023, 2(02): 68-85+147-148.
- [4] Yang Zongkai, Wang Jun, Wu Di, et al. Developing Smart Pedagogy to Promote Sustainable Education. *Journal of Educational Technology Research*, 2022, 43(12): 5-10+17.
- [5] Mou Zhijia, Feng Xiya, Su Fugen. From Perception to Evidence: The Structural System and Practical Pathway of Evidence-Based Teaching Evaluation. *Journal of Educational Technology Research*, 2024, 45(01): 68-75.
- [6] Wang Yiyan, Zhu Tao, Yang Shuhao, et al. Human-AI Collaborative Teaching: Motivations, Essence, and Challenges. *Journal of Educational Technology Research*, 2024, 45(08): 51-57.
- [7] Liu Lei; Liu Rui. Dilemma and Breakthrough in the Transformation of Teachers' Role in the Era of Artificial Intelligence: From the Perspective of Heidegger's Philosophy of Technology. *Open Education Research*, 2020, 26(3): 44-50.
- [8] Leilei Zhao; Yufei Ma; Ruihua Dai. Teachers' role and action orientation in AI in education. *Chinese Journal of Distance Education*, 2021, 42(7): 58-66.
- [9] Feng Yonggang; Qu Ling. The Ethical Risk of ChatGPT Applied in Education and Its Prevention and Control. *Inner Mongolia Social Sciences*, 2023, 44(4): 34-42, F0003.
- [10] Yuanlei, Leimin, Xujiyuan. Technology-Enabled, People-Oriented Intelligent Education Ecology: Content, Characteristics and Construction Path. *Open Education Research*, 2023, 29(2): 74-80.
- [11] Jia Jiyou; Le Huixiao; Li Zhuorun, et al. Artificial Intelligence Helps the Balanced Development of Education——Taking the Effective Tutoring of a Personalized Online Instruction System for Migrant Children as an Example. *China Education Technology*, 2022, 1: 42-49.
- [12] Guo Leilei. The Mechanisms, Risks and Responses of Generative Artificial Intelligence Driving Educational Transformation: Taking DeepSeek as an Example. *Chongqing Higher Education Research*, 2025, 13(3): 38-47.