

The Construction of an Ecosystem for Collaborative Cooperation Between Teachers and AI Tools in the Context of Artificial Intelligence

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Abstract. The profound integration of AI into educational systems necessitates fundamental transformations in pedagogical roles and instructional paradigms. This study systematically examines the architecture of collaborative ecosystems between educators and AI tools through three critical dimensions: core components, practical challenges, and implementation strategies. Our investigation reveals that educators must evolve from traditional "knowledge transmitters" into multifaceted roles encompassing "competency facilitators," "human-AI collaborators," "emotional guardians," and "lifelong learners" to adapt to AI-driven educational transformations. Current ecosystem development faces multifaceted challenges including cognitive dissonance between conventional educational philosophies and technological innovation, insufficient AI literacy among educators, ethical risks in technology deployment, resource allocation disparities, and diminished teacher-student emotional connectivity. To address these challenges, we propose an integrated framework featuring tiered professional development programs, human-AI collaborative pedagogy innovations, policy-resource alignment mechanisms, and ethical guideline reconstruction. This framework emphasizes the imperative of balancing technological empowerment with humanistic values, achieving dynamic equilibrium between educational efficiency and empathetic engagement. Our findings underscore that sustainable synergy ecosystems require preserving the human essence of education while leveraging technological advancements to enhance educational equity, quality, and holistic student development.

Keywords: artificial intelligence, teachers, collaboration, ecosystems, role remodelling

1. Introduction

The integration of artificial intelligence (AI) into education is reshaping pedagogical practices, learning processes, and educator roles. This transformation centers on synergistic human-AI collaboration to enhance instructional efficiency and equitable access to personalized learning. Educators now evolve from traditional "knowledge transmitters" to multidimensional roles as learning architects, cognitive mediators, and ethical navigators. This shift necessitates three research priorities: 1) maximizing AI's pedagogical potential, 2) fostering co-evolutionary frameworks for

teacher-student development in AI-augmented environments, and 3) systematizing implementations of AI-assisted instruction. Addressing these interconnected imperatives is critical for advancing responsible smart education ecosystems.

2. Elements of ecosystem building in the context of synergy

A teacher-AI collaborative ecosystem comprises three core actors: teachers (as guides and collaborators), students (active learners), and AI tools (adaptive assistants). Supporting elements include infrastructure, resources, and policies. For example, Feng highlights AI's role in writing skill development through teacher-student-AI co-design [1].

2.1. Teachers' professional skills and expertise

Teachers' professional skills and expertise mainly reflect the level and ability of teachers in terms of knowledge and skills [2]. That is to say, they can be understood as the core competence system of teachers in the process of education and teaching, through solid subject knowledge, teaching methods and practical ability, effectively organising teaching activities, solving teaching problems, and promoting students' knowledge acquisition and ability development. In traditional teaching, teachers are mainly responsible for the function of "knowledge transmitter"; in the traditional concept, teachers can assume the responsibility of "preaching and teaching" when they have solid academic knowledge and disciplinary literacy. In the era of artificial intelligence, teachers not only have subject knowledge, but also need to have the ability to use flexible technology media, and be able to skillfully use various types of artificial intelligence education software to enhance the efficiency and personalisation of student learning. In the context of the era of artificial intelligence, the rapid development of AI technology is changing the ecology of education, the boundaries between humans and machines will become increasingly blurred, which makes the integration of humans and intelligent machines has become inevitable [3]. Teachers also need to have innovative thinking and adaptability, flexibly respond to the problems and challenges brought about by the development of information technology and artificial intelligence, and follow up the conceptual innovation in the field of education in real time. Through continuous learning, practice and reflection, teachers can find a new position in the deep integration of technology and education, and provide better support for the overall development of students. Eventually, the role of teachers will change from "knowledge transmitter" to "learning guide", injecting more possibilities and creativity into education with the help of AI.

2.2. Teacher human literacy and emotional support

Teachers' humanistic literacy and emotional support means that teachers follow professional ethical norms, respect students' individual differences and pay attention to students' overall development as the core of their educational and teaching activities, and help students build up a sense of security, a sense of belonging and self-confidence by means of emotional exchanges, caring and support, so as to promote the development and growth of students in terms of their knowledge, ability and personality. Rachel defined teachers' emotional support as the care, understanding and respect for students shown by teachers through verbal and non-verbal behaviours during the process of education and teaching [4]. Rachel et al. define teacher's emotional support as the care, understanding, and respect for students that teachers show through verbal and non-verbal behaviours in the process of education and teaching. Xu Xingchun believes that emotional support as an

important part of social support, teachers' emotional support for students includes: active attention, expressing care and understanding, listening to students' difficulties, respecting students' personality, giving students encouragement, etc [5]. Teachers' humanistic literacy and emotional support are essential for both the teaching profession and educational quality. In the AI era, while technology enables efficient learning tools, it cannot replace the empathetic engagement human teachers provide. Educators must balance technological adaptation with emotional guidance—observing students' needs, fostering stable learning environments, and supporting holistic development (e.g., academic growth, personality shaping, and social adaptability). This reflects the dual imperative of integrating AI's efficiency while preserving education's humanistic essence.

2.3. Teacher ethics and sense of mission

Teachers must uphold ethical principles in AI integration by protecting student privacy, mitigating algorithmic bias, and balancing technological efficiency with educational equity. This commitment requires ethical awareness to ensure fairness in technology-driven decision-making, professional responsibility to embed moral education within pedagogical practices, and adherence to sustainable values that preserve humanistic ideals amid technological advancements. By integrating these dimensions, educators can navigate the complexities of AI adoption while maintaining the integrity of educational missions [6].

Teachers' sense of mission is the core component of their professionalism, which is a sense of responsibility for society, others and themselves based on the self-consciousness of individual teachers [7]. With the deep involvement of intelligent technology, artificial intelligence leaps from the data layer to the application layer, entering the fields of learning situation analysis, teaching monitoring, evaluation feedback, school governance and so on [8]. Human-machine interaction will become increasingly rich and diversified, and AI can quickly mobilise a variety of resources to complete relevant tasks. Teachers' daily experience and knowledge are too limited compared to the infinite resources of intelligent terminals, which makes it all the more necessary for teachers to firmly establish a sense of professional ethics and a sense of mission.

At the same time, in the modern education scenarios deeply empowered by artificial intelligence, teachers face the risk of unauthorised professional ethical boundaries and lack of data ethics due to the deep involvement of intelligent technology [9]. Therefore, teachers' professional ethics are faced with the need for reconstruction in many aspects: firstly, the awareness of technological ethics has become a necessary quality, and teachers should seriously solve the privacy problem and algorithmic fairness problem of the use of intelligent tools in the era of intelligence; secondly, the ability of human-computer collaboration needs to be improved urgently, and teachers should not lose the status of the main body of their own teaching decision-making in the teaching fuelled by intelligent technology; lastly, the guardianship of the original intention of education is even more challenging. input, focusing on the return of education and the role of technology, it is easy to lose the ideals and beliefs of education if the humanistic temperature of the heart is lost. For example, when intelligent systems push differentiated learning programmes, teachers must balance AI-driven data analysis with vigilance against algorithmic bias to uphold educational ethics.

3. The dilemma of building collaborative ecosystems in the context of artificial intelligence

Artificial Intelligence (AI) technology brings the possibility of efficiency improvement and model innovation to education, but still faces multiple practical challenges in the practice of building a collaborative ecosystem of teachers and AI tools. The intertwining of these issues not only

constrains the efficacy of human-machine collaboration, but also may exacerbate the imbalance of educational equity and the alienation of teacher-student relationships. Through the five dimensions of conceptual conflict, insufficient literacy, ethical risk, resource inequality and emotional weakness, we systematically analyse the core barriers to the construction of the current collaborative ecosystem, thus revealing the bottlenecks that need to be broken through in the process of technologically-enabled education.

3.1. Conflict between traditional education concepts and technological innovations

In the context of the new era, the rapid development of information technology and education in the continuous integration of artificial intelligence is promoting the transformation of the traditional education concept, education form, education scene, promoting the continuous development of education in the direction of intelligence and wisdom [10]. The high efficiency of AI technology, such as homework correction and knowledge explanation, has formed a multi-dimensional impact on the relationship between the main body of education, the authority of the teacher and the human-machine collaboration model. Intelligent technology can be used as an independent knowledge carrier (e.g., adaptive learning systems), as a teaching aid (e.g., AI teaching assistants), and as a participant in the learning process (e.g., educational robots). This multi-dimensional penetration breaks the traditional "teacher-student" binary structure, forming a new relationship network of "human-machine-human". However, some teachers are still very vague about their roles, sticking to the self-led teaching model, believing that AI may weaken their authority, and the central position of the teacher is gradually being challenged. This change may make teachers feel that their value and status are threatened, which may lead to identity confusion and anxiety, and lead to resistance to the application of technology [11]. Teachers' classroom discourse is significantly reduced but they still cling to their dominant position, so the effectiveness of human-computer collaboration is reduced. Intelligent systems reconfigure the knowledge dissemination path through massive knowledge nodes, which triggers "digital identity anxiety" among teachers, and only a few teachers are willing to actively adopt AI-generated high-quality teaching resources. Some teachers are not receptive to the concept of human-machine collaboration, and have not yet formed the perception of "AI as an assistant", and over-reliance on or rejection of technology exists side by side. The difference between urban and rural areas has also led rural teachers to fall into the double dilemma of "being able to use it but not using it" and "wanting to use it but not being able to use it", which seriously restricts the development of the collaborative ecosystem.

3.2. Deficiencies in teachers' AI literacy and technology application skills

In the context of the current process of promoting the digital transformation of education, the lack of teachers' AI literacy and technology application ability has become an important bottleneck factor restricting the development of education informatisation. The AI teacher competency standard for primary and secondary schools separately proposes the dimension of problem solving ability, arguing that primary and secondary school teachers should have the ability to identify, define, and abstract problems, and on this basis, design or select problem solving strategies, and carry out collaborative human-computer education and teaching problem research practices [12]. Firstly, the lack of a training system is a central problem. For example, although many schools and educational institutions have realised the importance of AI technology, systematic training for teachers has not yet been formed. Existing training resources are scarce, and the frequency of content updating is far from keeping pace with the development of technology, resulting in teachers often lacking the

necessary theoretical knowledge and practical training skills and experience when facing some emerging AI tools. Teachers in remote areas, in particular, have even more limited access to training opportunities, and this uneven distribution of resources further creates and exacerbates the huge gap in teachers' AI literacy. In addition, there are obvious deficiencies in the training methods. Traditional "duck-filling" training can hardly stimulate teachers' interest in learning, lacks interactivity, and fails to provide effective guiding suggestions for teachers' problems, so it is difficult for teachers to transform what they have learnt into practical teaching and learning abilities after training, and it is difficult to achieve the goal of "duck-filling" training. It is therefore difficult for teachers to translate what they have learnt into practical application in teaching after training, and it is difficult to truly achieve the purpose of the "duck-filling" approach.

The mismatch between AI's technical complexity and pedagogical practicality poses significant challenges. Many teachers lack the programming or data analysis skills required to operate AI tools effectively, while underdeveloped educational AI systems often increase workloads rather than streamline instruction. This disconnect diminishes teacher receptiveness to AI adoption and hinders technology integration in education. Addressing these gaps necessitates developing user-friendly AI tools aligned with authentic teaching scenarios and providing targeted technical training to bridge competency divides.

3.3. Risks to ethical and educational effectiveness in the use of technology

The rapid adoption of AI tools in education introduces dual risks: ethical dilemmas (e.g., data privacy breaches, algorithmic bias) and pedagogical concerns, such as diminished critical thinking due to over-reliance. Limited teacher awareness of data ethics exacerbates these issues, while students increasingly prioritize AI-driven expediency over intellectual exploration, undermining independent problem-solving capabilities. Addressing these challenges requires robust governance frameworks, educator training in ethical AI use, and pedagogical strategies to balance technological efficiency with cognitive development goals. Artificial Intelligence through algorithmic innovation has demonstrated powerful reasoning and expansion capabilities, and efficient knowledge production has made human beings more and more dependent on the cognitive assistance of technology to offset their own limitations when facing and dealing with complex knowledge, and gradually transformed this dependence into recognition of the authority of generative AI knowledge [13]. While AI tools may superficially enhance efficiency by automating tasks like essay writing or problem-solving, they risk eroding students' capacity for critical analysis and independent learning – foundational educational objectives. Prolonged dependence on AI-generated solutions could diminish intellectual curiosity and hinder the development of innovative thinking, ultimately threatening the pedagogical ecosystem by displacing cognitive engagement. This paradox necessitates a rigorous re-evaluation of technology's role in education: stakeholders must collaboratively establish ethical frameworks that align technological applications with core educational values, ensuring progress prioritizes cognitive development over mere operational efficiency.

3.4. Imbalance in resource allocation and technological environment

In the context of AI, the construction of a collaborative ecosystem of teachers and AI tools faces many challenges, among which the imbalance of resource distribution and technological environment is particularly prominent. AI educational resources are often concentrated in cities and developed areas, while rural and remote areas are scarce, exacerbating the unfair distribution of

educational resources [14]. Rural schools lack AI infrastructure due to funding gaps. For instance, 535 counties in China allocate less than 1.4% of agricultural budgets to digital education, limiting access to AI tools and exacerbating urban-rural inequity [15]. It can be seen that the current allocation of resources to rural areas still makes it difficult to meet basic digital education infrastructure needs.

At the same time, whether the financial and policy support to ensure that the ecosystem of teachers working with AI tools can be sustained in the long term is also a major difficulty in constraining the construction of this ecosystem. The construction of a perfect AI education ecosystem requires a large amount of long-term financial investment, including the purchase of advanced AI equipment, supporting AI software and related teacher training. However, some regions have difficulties in providing stable and sufficient financial support for the construction of AI education ecology on a sustainable basis due to high financial pressure. The research and development and application of AI technology requires a large amount of financial support, and the lack of funds further restricts the landing and push of the technology [16]. This also makes some schools, after introducing AI tools, unable to timely update their equipment or optimise and upgrade their systems due to insufficient follow-up funding, resulting in a significant reduction in the application of AI tools. In addition, there are some implementation bias problems in the process of policy implementation. This lack of stable and adequate financial and policy support not only affects the process of building a collaborative ecosystem of teachers and AI tools, but also hinders the realisation of educational equity to a certain extent.

3.5. Weakening of teacher-student interaction and emotional connection

While AI offers significant pedagogical convenience, it cannot replicate the profound emotional dimensions inherent in education. Beyond unidirectional knowledge transmission, education fundamentally relies on face-to-face interactions where teachers cultivate moral awareness and learning motivation through empathetic dialogue, personalized guidance, and value-based mentorship. AI systems inherently lack human capacities to discern nuanced emotional states, respond adaptively to psychosocial needs, or deliver authentic socioemotional support critical for holistic student development. AI tools lack genuine emotional understanding (e.g., GPT-4 mimics but does not feel emotions), risking "dehumanized" classrooms. This is essentially an emotionless imitation [17]. This lack of emotion may lead to the gradual "dehumanisation" of the classroom, so that students become mere recipients of knowledge, thus affecting the development of students' socio-emotional abilities, hindering their interpersonal communication, emotional expression and understanding, and not conducive to the shaping of their sound personality.

The widespread adoption of technological tools has profoundly reshaped educational practices. However, overprioritizing technological efficiency risks marginalizing the humanistic essence of education. AI-driven standardized solutions, often relying on generalized rules derived from big data analysis, frequently overlook individual learning needs and fail to address student diversity. If teachers blindly adopt the teaching programmes and learning materials provided by AI just for the sake of work convenience, there will be no exchange of ideas and lack of innovative expression during the teaching process, and a sense of distance may arise between teachers and students due to the high wall of technology, and the role of teachers will degenerate into that of an AI implementer [18]. Unlike AI, human teachers excel in interpreting non-verbal cues (e.g., facial expressions, behavioral patterns) to dynamically adjust pedagogical strategies and personalize instruction. While AI relies on standardized frameworks constrained by algorithmic limitations, over-dependence on its

mechanistic approaches risks diminishing opportunities for individualized learning, ultimately hindering holistic student development and adaptive educational outcomes.

4. Positioning and reconstruction of teachers' roles in collaborative ecosystems

The deep involvement of artificial intelligence technology has put forward brand-new requirements for the positioning and connotation of teachers' roles. Facing the dual challenges of technological empowerment and humanistic values, teachers need to break through the boundaries of traditional functions and reposition their values under the framework of "human-computer collaboration". In this paragraph, we try to systematically consider teachers from the perspectives of four identities: "competence guide", "human-computer collaborator", "emotional guardian" and "lifelong learner". This paragraph attempts to systematically analyse the transformation path of teachers' roles from the perspective of the four identities.

4.1. From knowledge transmitters to facilitators of higher-order competencies

In the traditional teaching mode, the teacher's main task is to deliver knowledge in one direction, and the students accept it passively. Compared with the single teaching mode, AI tools, with their powerful automatic generation and intelligent analysis capabilities, can help teachers complete the collation of knowledge and basic teaching work, while freeing teachers from heavy physical labour and freeing up more time to cultivate students' higher-order literacy, such as critical thinking, creativity and problem solving. Teachers can use data analytics to support personalised learning, develop personalised learning paths for each student, provide advice and guidance on teaching methods, and ensure that learning goals are achieved [19]. At the same time, when designing inquiry-based learning projects, teachers should also lead students to identify problems and collaborate to overcome authentic challenges, rather than focusing on standard answers.

4.2. The role of "human-computer collaborators" in multiple collaborations

In the age of artificial intelligence, teachers will be abandoned by history if they lack the ability to understand and apply technology [20]. AI tools can complement teachers' strengths, create teaching in activities, and reshape the teaching process. AI undertakes repetitive and monotonous mechanical tasks such as homework corrections and learning data analyses, and generates personalised learning paths by accurately locating students' weaknesses to provide the basis for teachers' adjustments to their teaching strategies. Teachers, on the other hand, devote themselves to teaching design, emotional interaction and personalised guidance, combining the results of AI analysis with customised one-to-one tutoring programmes for students. For example, after the AI analysis found that the students' mathematical thinking deficiencies, the teacher used fun mathematical modelling activities to check for gaps. Tabtor Math, developed by Raj E. Valli's team in the United States, provides personalised tutoring in mathematics for primary and secondary school students, and the system will provide an analysis of the student's learning situation and recommend learning content suitable for the student, providing students with a tailor-made learning schedule [21]. This "AI-assisted + teacher-led" model requires teachers to have the skills to integrate technology and put AI into the whole teaching activity. Teachers use the intelligent analysis platform to understand the learning situation of the class, and use the multimodal resource generation tool to enhance their teaching content, so that technology can deeply empower teaching.

4.3. Guardian of emotions and ethics

AI has inherent deficiencies in emotion and ethics, which must be compensated for by human teaching behaviour. In teaching, teachers should always pay attention to students' mental health and dispel the "cold feeling" brought by the application of technology with humanistic care. Teachers should actively explore and practice a variety of interactive modes, such as online and offline blended teaching, group discussions, case studies, etc., in order to increase the frequency and depth of interaction between teachers and students [22]. Especially when students encounter academic setbacks, teachers' encouragement and comfort is the warm power that AI cannot provide. Teachers should give students timely and accurate feedback, including evaluation of learning outcomes, guidance on learning methods, and suggestions for personal development; they should also encourage students to give teachers feedback on their own learning experiences and feelings, so that teachers can adjust their teaching strategies and methods in a timely manner. At the same time, teachers must guide students to face up to the ethical problems that technology may bring in the AI era, such as privacy leakage, algorithmic bias, etc., and also cultivate a sense of responsibility for the use of their own technology.

4.4. Practitioners of lifelong learning and professional development

At the present time, teachers should continue to explore new modes and methods of teaching with the participation of intelligent technology, and form the ability literacy to coordinate human-computer relations in order to adapt to the changes occurring in the educational environment [23]. Teachers should endeavour to practice to become experts in mastering basic AI principles, using educational technology products such as intelligent analysis platforms and multimodal resource generation tools, and also devote themselves to specific technological training activities to learn more from their colleagues, exchange ideas and learn from each other, polish their thoughts and draw on cutting-edge theories. What's more, it's crucial to develop the habit of reflective practice and deeply integrate AI technology with teaching innovation. Teachers carefully record each teaching attempt, analyse the effect of AI application, gradually precipitate a unique "technology-education" integration ability, and progress towards becoming a student character builder, human-machine efficient synergist, education temperature escort, and professional development leader on the way of students' growth.

5. Conclusion

Based on the clear direction of teachers' role transformation, the construction of an ecosystem for teachers' cooperation with AI tools requires concerted efforts from conceptual innovation, technical training, model innovation, resource integration and institutional guarantee. This section focuses on the three core areas of technological empowerment, policy support and ethical norms, and proposes specific implementation strategies such as hierarchical training system, human-computer collaborative teaching mode, open resource platform and dynamic evaluation mechanism. This paragraph tries to provide an action blueprint for the construction of a collaborative ecosystem through the combination of theory and practice.

5.1. Technology-enabled teacher training systems

The integration of AI into education necessitates a shift in teacher training from subject-centric to technology-driven approaches. A hierarchical framework is proposed to address diverse competency

levels. Novice teachers receive foundational training in AI concepts and classroom integration, supported by case-based simulations. Backbone teachers engage in advanced modules on data-driven pedagogy and ethical AI use, fostering leadership in school-based innovation. Mentor teachers lead cross-institutional research and resource-sharing networks to scale best practices.

To operationalize this framework, a practice-oriented AI platform is recommended. This platform digitizes classroom scenarios (e.g., flipped classrooms, project-based learning) and enables teachers to simulate teaching processes with AI-generated feedback on student engagement and learning outcomes. Through iterative practice and data analysis, teachers refine pedagogical strategies, achieving continuous improvement in AI-aided instruction.

5.2. Innovation in human-computer collaborative teaching models

Entering the new stage of transformation from "human-teaching and machine-assisted" to "human-machine co-teaching", the innovative teaching model needs to deeply integrate the advantages of AI with the professional judgement of teachers. First, interactive personalised support based on learner profiling has become possible. Teachers can use intelligent technology to design different teaching modes and formulate learning paths that meet the characteristics of students according to different students and learning conditions, so as to achieve personalised learning for students [24]. The AI system can generate a dynamic portrait of a student by collecting information on the student's cognitive level, interests and preferences, and learning behaviours, and processing the above information. Teachers can then use these profiles to provide students with specially designed homework packages, extension tasks, and challenge activities in order to tailor their learning to the students' needs.

5.3. Policy support and resource integration

National strategies should prioritize rural AI infrastructure (e.g., expanding broadband access) and fund teacher training programs. Open resource platforms can standardize AI tools for cross-school sharing. First of all, the government must carry out top-level design at a strategic level, formulate a practical AI education development plan, make full use of special funds (such as the "New Strong Teachers Project"), and give sustained investment and policy inclination to teacher training, construction of demonstration districts and technology pilot projects, so as to create a virtuous cycle of advanced and typical models to lead the way and a wider scope of replication and promotion. On the other hand, it is necessary to strengthen the construction and improve the construction of an open and shared education resources ecosystem, integrate the education sector, universities, research institutes and enterprises with high-quality resources, and set up a large platform for intelligent lesson planning, virtual experiments, learning diagnosis, and teaching evaluation and other elements of the AI education resources platform, and promote the standardisation of its resources, It also promotes the standardisation of its resources and the interoperability of its interfaces, realises the use of resources across districts and schools and the allocation of resources according to needs, and solves the problem that teachers in primary and middle schools and remote areas can't use the technology.

5.4. Reconstruction of ethical norms and evaluation systems

In the process of AI's deep involvement in teaching, ethical risks and evaluation mechanisms need to be updated simultaneously to ensure the fair, transparent and healthy development of technology

application. In this process, ethical guidelines for AI education should be formulated and promoted to clarify the legal compliance boundaries of data collection and use, standardise algorithm transparency, interpretability and division of power and responsibility, and prevent the infringement of teachers' and students' rights and interests caused by privacy leakage, algorithmic bias and technology abuse. It is also necessary to reconstruct the evaluation system of teachers and students to achieve multi-dimensional and all-round quality monitoring. Teachers' evaluation should incorporate their technical ability, innovative teaching practices and professional development results in AI-assisted teaching; students should also take into account their comprehensive academic performance, and in addition to examining their interest in learning and teamwork ability, they should also increase the examination of information literacy, critical thinking and social responsibility, so as to truly reflect the educational goal of "moral, intellectual, physical, social and aesthetic" comprehensive development in the era of intelligence. This will truly reflect the educational goal of "moral, intellectual, physical, aesthetic and labour" in the smart era.

References

- [1] Feng Yanling. (2024). Construction of AI-assisted College English Writing Integration Model. *Journal of Jiaozuo Teachers College*, 40 (04), 58-60.
- [2] Lin Baodeng. (2024). Teachers' Professional Identity in the Age of Artificial Intelligence: Lost and Return. *Journal of Yangzhou University (Higher Education Research Edition)*, 28 (06), 11-18.
- [3] Li Zhengtao & Luo Yi. (2019). Life Evolution and Education in the Age of Intelligence. *Educational Research*, 40 (11), 39-58.
- [4] Massey, Rachel. (2010) A Q-methodological study to investigate the views of children and young people who are deaf: how adults in educational settings help to support their social and emotional wellbeing. University of Sheffield.
- [5] Xu Xingchun, Yang Junjun & Jia Juan. (2014). Research on the Development and Characteristics of Teacher's Emotional Support Questionnaire for Middle School Students. *Journal of Southwest University (Natural Science Edition)*, 36 (06), 175-179.
- [6] Wang Houxiong & Li Meng. (2020). Connotation, Elements and Development Path of Core Literacy of Excellent Teachers. *Educational Science*, 36 (06), 40-46.
- [7] Zhang Limin. (2012). Discussion on the Connotation and Characteristics of Teachers' Mission. *Teacher Education Research*, 24 (06), 7-12 + 19.
- [8] Li Dong. (2020). Teacher Development in the Age of Artificial Intelligence: Trait Orientation and Action Philosophy. *Audio-Visual Education Research*, 41 (12), 5-11.
- [9] Su Qimin & Tao Yanqin. (2021). New Trends of American Teachers' Professional Code of Ethics in the Age of Artificial Intelligence. *Comparative Education Research*, 43 (09), 50-59.
- [10] Yu Lizhu. (2025). Research on the Teaching Model of College English Critical Thinking Ability Based on AI. (EDS.Proceedings of the Symposium on Higher Education Teaching in 2025 (Volume II) (pp. 32-33). Liaoning Police College.
- [11] Wang Wenji & Lei Shangjun. (2024). Dilemma and Reshaping of the Role of University Teachers in the Age of Artificial Intelligence. *Journal of Higher Education*, 10 (31), 99-101 + 105.
- [12] China Academy of Educational Sciences. Competency Standards for Teachers of Artificial Intelligence in Primary and Secondary Schools (Trial). (2022-03-21).
- [13] Jiang Xiumin & Zhang Jiayin. DeepSeek's Intervention in the Academic System of Humanities and Social Sciences Promotes the "Intelligence-Enhanced Academic Paradigm". *Journal of Beijing Administration College*, 1-12.
- [14] Hu Xiaoyong, Liu Xueni, Chen Lishi, Liu Yanfan & Liu Xiaohong. (2025). Integrating Artificial Intelligence into Basic Education: Helping the Internal Volume or Improving the Quality? *Open Education Research*, 31 (02), 45-54.
- [15] Zhao Liang. (2023). Analysis of High-quality Development of Digital Agriculture in the Perspective of Rural Revitalization. *People's Forum*, (02), 81-83.
- [16] Liu Hao & Liu Xinhui. (2025). Strategies for the Integration of Artificial Intelligence and smart education for the Elderly. *Journal of Liaoning Teachers College (Natural Science Edition)*, 27 (01), 67-71 + 79.

- [17] Gao Chenghai, Dang Baobao, Wang Bingjie & Wu Shengtao. Language Advantages and Disadvantages of Artificial Intelligence: a Comparison of Language Competence Based on Big Language Model and Real Students. *Journal of Psychology*, 1-27.
- [18] Xu Shanshan. (2025). Reconstruction of Teachers' Role in the Age of Artificial Intelligence: Opportunities, Challenges and New Orientation. *Science and Education Collection*, (05), 36-39.
- [19] Tian Jian, Mao Wei & Zhao Qingfang. (2018). Multiple Learning Communities: Teacher Development Path in the Age of Artificial Intelligence. *People's Education*, (Z2), 85-88.
- [20] Li Yang & Zeng Xiangyi. (2022). Artificial Intelligence Enabling High-quality Development of Teaching and Research: Theoretical Framework, Practical Blueprint and Development Context of Intelligent Precision Teaching and Research. *China Audio-Visual Education*, (11), 99-107 + 122.
- [21] Zhou Ling & Lv Yuhui. (2025). Intersection and Integration: Research on the Reform of Art Design Teaching in the Age of Artificial Intelligence. *Art Research*, (02), 116-118.
- [22] Wang Man & Lv Jianqiang. (2021). Teachers in the Digital Age: Identity Transformation and Value Reshaping. *Contemporary Educational Science*, (09), 35-41.
- [23] Hu Xinyue. (2024). The Dilemma and Outlet of Teachers' Role Change in the Age of Artificial Intelligence —— Based on the Perspective of Transformational Learning Theory. *Vocational Education Research*, (02), 68-75.
- [24] Wang Na & Zhang Lei. (2025). Research on AIDS Health Education Model for College Students from the Perspective of Artificial Intelligence. *Huaxia Medical Journal*, 38 (02), 186-191.