Int. J. of AI and Education Technology

♦ ISSN: 2835-2432 Vol: 05, No. 02, 2026 ♦ PP. 43–47

Article DOI: https://doi.org/10.54216/IJAIET.050205

FULL LENGTH ARTICLE

How Should Higher Education respond when AI enters the Classroom?

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Received: November 08, 2025 Revised: December 15, 2025 Accepted: January 14, 2026 ⋆ Corresponding author

ABSTRACT

Driven by the global informatization wave, AI technology is leading a profound change in education, and the traditional higher education model is facing unprecedented opportunities and challenges. Firstly, the advantages of the comprehensive integration of "AI+ Education" are sorted out from the two aspects of students and teachers. Secondly, it analyzes the transformation of teachers from classroom manager to learning ecological designer from three aspects: education personalization and fairness, man-machine teaching collaboration and interdisciplinary scene innovation. Next, the construction of student evaluation system is discussed from four dimensions of thinking visualization. Finally, the author expounds the characteristics of the teaching profession that cannot be replaced by AI.

Keywords: AI ▪ Higher Education ▪ Classroom ▪ Challenge ▪ Transformation

1. INTRODUCTION

AI is an artificial intelligence technology that uses complex algorithms, models, and rules to create new content such as text, images, sounds, videos, and codes through large-scale data learning and training. AI represented by ChatGPT quickly set off a wave of large-scale model research and development around the world. ChatGPT reportedly surpassed 1 million registered users in just five days after its launch; The number of monthly active users exceeded 100 million within two months of launch. According to Singapore's Lianhe Zaobao website reported on January 27, after the release of the new model of Chinese artificial intelligence (AI) company DeepSeek, the heat continued to soar. As of Monday morning, DeepSeek was the No. 1 download on Apple's free App Store in both China and the United States. At present, AI technology has been widely used in many fields such as education, healthcare, agriculture, and finance. It has revolutionized the way researchers conduct natural language processing and artificial intelligence research, enabling not only the creation of more advanced chatbots and conversational agents, but also easier collaboration and data sharing, as well as access to and analysis of large data sets from a variety of sources.

AI technology is gradually penetrating into all fields of education, bringing a profound change to traditional higher education and promoting the innovation of educational theories [1, 2, 3, 4]. According to the individual needs of students, AI can provide personalized and adaptive teaching services, and tailor appropriate learning methods for them. At the same time, it can also provide strong support in writing, whether it is daily writing or research paper writing, it can give helpful advice and assistance to help students improve their writing level. The application of AI technology has changed the original ecology of the classroom, promoted the teaching mode from the dual structure of "teacher - student" to the ternary structure of "teacher - machine - student", realized the full coverage of the learning process, and created a

human-computer collaborative learning space [5].

2. COMPREHENSIVE INTEGRATION OF "AI+ EDUCATION"

More and more AI intelligent tools are becoming an important driving force for innovation in higher education [6, 7, 8, 9, 10]. From the perspective of students, AI can provide personalized course content and feedback based on students' cognitive level and learning preference, enhance classroom interaction and personalized experience, and identify students' mood swings and knowledge blind spots through big data analysis to provide more accurate learning feedback. AI intelligent dialogue system, can provide students with instant, personalized learning guidance, answer questions. For example, when the teacher explains the Differential Amplifier Circuit in class, students feel a little difficult, and they can learn the core principle, structural characteristics, application scenarios, performance indicators and limitations of the differential circuit online through AI tools. A more reasonable learning structure can be used to give full play to students' subjectivity by deeply integrating AI large models into the classroom. From the perspective of teachers, the deep penetration of AI has redefined the professional connotation of teachers, and mastering AI tools has become a necessary skill for teachers. In the traditional classroom, the one-way knowledge transmission mode of "teachers speak, students listen, and auxiliary exercises" is accelerating the collapse under the impact of AI technology. Teachers are transforming from "knowledge content imparts" to "knowledge system builders", and their roles are shifting from one-way output to instructional design. The use of AI tools to take over the basic work such as knowledge sorting and exercise generation, so that teachers can turn their energy to the creative design of learning scenes. Let AI assume the basic function of knowledge transmission, and the core value of teachers will turn to thinking guidance and accurately intervene in students' cognitive blind areas. Teachers use AI tools to develop interdisciplinary courses, break through disciplinary barriers and design integrated courses, from a single subject knowledge to a cross-resource integrator. AI has entered college education, creating exclusive learning experiences for learners, and providing comprehensive instructional design support for educators. However, this integration process is also faced with multiple obstacles such as technological adaptability, teacher team construction, curriculum system reform, etc. It is necessary to improve the top-level design, strengthen technological innovation, and promote the establishment of industry-university-research cooperation strategies.

3. TEACHER'S TRANSFORMATION FROM CLASSROOM LEADER TO LEARNING ECOLOGY BUILDER

With the advent of the AI era, general knowledge and skills will be greatly devalued, and teachers' sense of crisis will deepen. So what are the challenges for teachers? Where is the living space? Where is the pace of development? This is a series of questions worth thinking about. The deep integration of AI and education will inevitably bring about innovations in educational theories. In the traditional teaching process of higher education, the role of teachers is: "knowledge transmitter", "learning progress manager", "classroom order maintainer". However, under the background of deep and close integration of artificial intelligence and education, it has gradually transformed into: "planner of learning content", "supervisor of learning quality", "promoter of learning state", etc. These changes not only involve the innovation of teaching methods, but also include the systematic reconstruction of educational concepts, technology application and education goals. Teachers need to break through traditional classroom management thinking, turn to building virtual learning scenarios, integrate resources through AI technology, and design personalized learning paths. Teachers can dynamically adjust the teaching content, build a global, personalized learning scene, and help students adapt to the future needs of society. Future college teachers need to have both educational wisdom and technical sensitivity, and cultivate a new generation of learners with global competitiveness. Figure 1 is a schematic diagram of the role transformation of teachers under the integration of "AI+ Education".

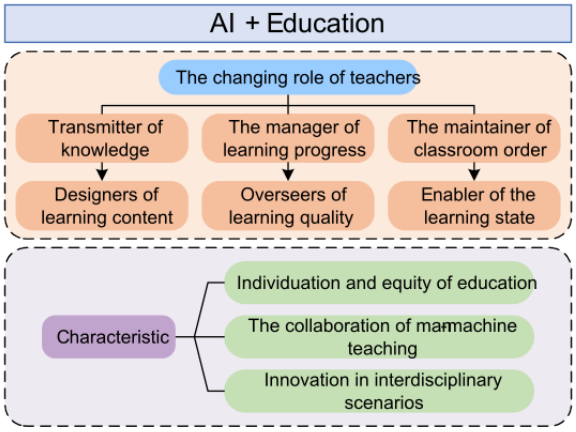

Figure 1. The role transformation of teachers under the integration of "AI+ Education".

3.1 Individuation and equity of education

Personalized education can establish a growth profile covering learning motivation, cognitive level and knowledge construction ability based on the analysis of learning situation map. Develop selective modular curriculum resources; Design scaffolding teaching activities to promote deep learning, and realize the closed-loop teaching of "assessment - diagnosis - intervention - execution". Different from traditional standardized education, this model uses learning analysis technology to continuously track students' cognitive development curve and dynamically adjust teaching strategies based on multidimensional data.

AI technology supports emerging forms of education such as distance education and online tutoring, providing more people with the opportunity to receive high-quality education, which enables students in underdeveloped countries and regions to access high-quality educational resources through online platforms. At the same time, the AI system can recommend personalized learning resources for students according to their learning status, needs and interests, so as to achieve equal access to educational resources. Of course, AI technology can easily break down language learning barriers,

improve students' learning experience, and further promote educational equity.

3.2 The collaboration of man-machine teaching

This is one of the most discussed topics in education right now, with the help of machine intelligence analysis and teachers' experience judgment, the teaching objectives that meet students' differentiated needs are established under the framework of man-machine collaborative teaching. As a teacher's assistant, AI can provide students with services such as answering questions, personalized learning content formulation, and all-round learning process management, assist teachers in precision teaching, create a learning atmosphere, participate in or guide classroom interaction, and provide emotional interaction for teachers and learners. For example, in man-machine collaborative teaching, AI assistants can collect and analyze students' learning data in real time, such as learning progress, homework completion, experimental data, etc., understand students' learning needs and difficulties through data analysis, and provide teachers with a comprehensive report on students' learning status. According to the report and their own teaching experience, teachers make personalized evaluation and feedback to students, guide students to improve learning methods and strategies, and improve learning results. Therefore, the main responsibility of teachers has evolved to accurately identify students' current knowledge mastery level and grasp the balance between learning rhythm and learning goals by relying on human-computer collaborative environment.

3.3 Innovation in interdisciplinary scenarios

Constructing interdisciplinary curriculum system is the basis of realizing teaching scene innovation. For example, the AI-driven energy network optimization platform combines courses such as power electronics, aerodynamics, mechanical design and manufacturing to simulate dynamic adjustment of grid load distribution and access to renewable energy sources such as wind and photovoltaic, allowing students to experience the role of different disciplines in practice in a virtual environment. Interdisciplinary scenario construction can also adopt project-based learning, collaborative learning and other methods, so that students can learn how to apply the knowledge and skills of different disciplines to solve practical problems in team cooperation. In this process, building a practice platform is an important way to achieve interdisciplinary scene innovation. Universities can cooperate with enterprises and research institutions to establish practice platforms such as laboratories and innovation centers to provide students with opportunities for practical operation and innovation. For example, Seoul National University and Samsung Electronics jointly built a joint AI research center, focusing on intelligent chips, robot perception and other cutting-edge fields, through the guidance of corporate mentors, real research and development project participation, to cultivate students' dual-track ability of algorithm development and engineering landing. The school-enterprise joint laboratory is becoming the core engine driving industrial upgrading and educational innovation through technical collaboration and resource integration.

4. EVALUATION SYSTEM OF THINKING VISUALIZATION

The traditional curriculum evaluation system often takes examination scores as the main evaluation index, ignores the individual differences of students, and is difficult to meet the needs of personalized education. Moreover, the evaluation method is too simple, and can not reflect the learning effect of students comprehensively and objectively. The introduction of AI technology provides new opportunities and possibilities for the evaluation of visual thinking in college classrooms. Relying on AI to build intelligent classroom teaching environment and provide the basis for visual thinking evaluation, mainly reflected in the following four dimensions to achieve:

(1) **Knowledge understanding ability:** Students' understanding and analysis ability of knowledge are evaluated by analyzing various behavioral data in class, including expressions, movements, frequency of participation in discussions, and performance in homework and exams.

(2) **Knowledge relevance ability:** Pay attention to students' speech content, build knowledge graph, show students' understanding and relevance of knowledge points, and judge their active degree of thinking.

(3) **Knowledge application and innovation ability:** Students are encouraged to put forward novel ideas and solutions to break the shackles of traditional thinking. Students can be evaluated by their creative work, research projects, etc.

(4) **External performance ability:** Students' performance in group discussions and question-and-answer sessions, such as ideas put forward and interactions with others.

5. THE TEACHING PROFESSION HAS QUALITIES THAT CANNOT BE REPLACED BY AI

There are different opinions and viewpoints on whether teachers will lose their jobs in the age of artificial intelligence. On the one hand, some people think that teachers will not be unemployed, because the role and value of teachers is not only to impart knowledge, but also to cultivate students' comprehensive quality, emotion, creativity and so on, which are difficult to be replaced by machines. On the other hand, some people think that teachers may face the risk of losing their jobs, especially those who can not adapt to the social development and only learn from the book. Based on the following three points [11, 12, 13, 14, 15], the authors believe that the teaching profession will not be replaced by AI, Figure 2 shows the core traits of the teaching profession:

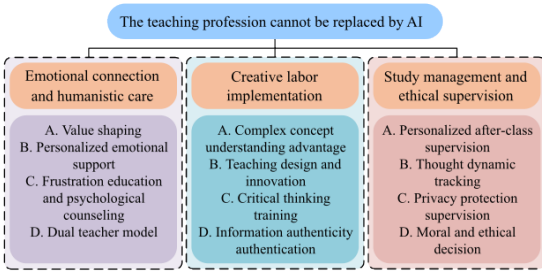

Figure 2. The core characteristics of the teaching profession.

5.1 Emotional connection and humanistic care require teacher efforts

Education is not only the transfer of knowledge, but also the in-depth interaction of students' psychological needs, value shaping and emotional support. Although AI can accurately analyze learning data, it cannot replace personalized care such as frustration education and psychological counseling given by teachers. Students are people with distinct personalities and feelings. Teachers must communicate with their feelings to achieve the purpose of educating students. AI, on the other hand, has no feelings and cannot transmit and communicate feelings. In the future, the classroom may become a "two-teacher model": the "AI teacher " is responsible for imparting knowledge, and the teacher focuses on the growth, emotions, feelings and other aspects of the students to solve the emotional and psychological problems of the students.

5.2 Creative labor requires teacher implementation

Human teachers have an advantage over AI when it comes to understanding complex human language, concepts, or problems. For example, in the process of designing teaching plans, according to the situation of students and the content of textbooks, the selection of learning methods and teaching methods is a creative labor, which is difficult to replace by robots. Although AI continues to learn and improve, there are still many shortcomings in complex situations. Living in an age where answers can be easily obtained online, the author is concerned that when students face a challenging problem, they will first think of turning to AI tools, rather than solving the problem by themselves. Faced with a lot of information on the Internet, how to help students to check the authenticity of information from the Internet is very important. As a teacher, we need to cultivate students' curiosity, but also develop their critical thinking, so that students can harness Internet knowledge with insight, and prepare them for the challenges of the AI era.

5.3 Learning management and ethics require teacher supervision

Teachers can supervise after class, not only record the progress of learning, but also pay attention to the dynamics of students' thoughts and strengthen their knowledge. At present and in the foreseeable future, it is difficult for AI to achieve such detailed and emotional, human culture management and supervision after class as teachers. Teachers can act as supervisors in the use of AI to ensure that the AI does not make unfair decisions and that the privacy of students is not violated.

At present, there are some opinions that teachers will lose their jobs in the era of artificial intelligence and will eventually be replaced by AI. This view only defines the teaching profession as "textbook". In fact, teaching and educating people are never a single individual, they are the integration of an organic whole. Although AI will not lead to overall teacher unemployment, it will trigger a deep restructuring of the connotation of the profession. The future education ecology will form a new collaboration model of "AI handling standardized processes + Teachers lead creative work ". Teachers can make use of the technical advantages of artificial intelligence to improve teaching efficiency and quality, realize the common growth of teachers and students, and build competitive barriers in fields that cannot be replaced by AI [16].

6. SUMMARY

The comprehensive integration of AI in the field of education not only changes the concept of higher education, but also enriches the teaching methods. At the same time, it breaks the traditional limitation of educational evaluation and promotes the innovation of educational model. In short, AI is having a profound impact on the field of education. However, in the process of education, AI has also brought many problems: first, the massive information brought by intelligent production, the phenomenon of knowledge fragmentation, and the verification problems caused by knowledge ubiquity are easy to make students shallow thinking. Second, the intuitiveness of technological "intelligent substitution" may make students' learning superficial and weaken their ability to think independently. Third, over-reliance on AI learning may cause multi-dimensional negative effects on students, such as thinking inertia, weakening of knowledge structure and critical thinking, and degradation of deep learning ability. Finally, AI exacerbates ethical challenges in higher education, creating a crisis of academic integrity, data bias leading to evaluation bias, and data privacy protection needs to be addressed. To sum up, human beings need to dialectically treat the promotion and application of AI in the field of education, and establish a series of multi-dimensional teaching practice systems. From the perspective of historical development, the psychology, emotion, emotion and ethics of human teachers are combined with the intelligence, digitalization, informatization and electronization of AI teachers.

ACKNOWLEDGMENTS

This work was supported by the Hunan University of Science and Technology Teaching Reform Research Project (904-G23530, 904-G32521), Hunan Provincial General Project of Teaching Reform Research for Regular Undergraduate Colleges and Universities (202502000833).

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