Global Research in Higher Education
ISSN 2576-196X (Print) ISSN 2576-1951 (Online)
Vol. 9, No. 2, 2026
www.scholink.org/ojs/index.php/grhe

Original Paper

The Application, Dilemma and Optimization Path of Agent Technology in College Classroom Teaching

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Received: June 5, 2026 Accepted: June 22, 2026 Online Published: June 26, 2026

doi:10.22158/grhe.v9n2p105 URL:http://dx.doi.org/10.22158/grhe.v9n2p105

Abstract

With the continuous advancement of education digitization strategy and the maturity of generative artificial intelligence technology, the classroom teaching reform in colleges and universities has obtained new technical support. There are many inherent shortcomings in the traditional teaching mode. AI agents with the ability of dynamic interaction and independent decision-making can effectively make up for the shortcomings of traditional teaching and become an important tool for innovating classroom teaching forms. Based on the teaching practice of colleges and universities, this paper combs the classroom application value and practical path of AI agent, and summarizes the practical problems such as weak adaptability of technical scene, deviation of education orientation, and insufficient digital application ability of teachers and students. Based on the law of higher education development and the logic of technology application, this paper puts forward optimization strategies from the dimensions of technology iterative optimization, teaching ecological integration, long-term mechanism construction and digital literacy cultivation of teachers and students, aiming to promote the standardization and deep integration of AI agents into the teaching system of colleges and universities, and provide practical reference for the construction of high-quality digital intelligence education in colleges and universities.

Keywords

Agent technology, College classrooms, Teaching reform

1. Introduction

The big language model is constantly updated and upgraded to promote the maturity of AI agent technology, which has been gradually put into use in college classrooms. Different from the traditional teaching tools with weak functions, the agent can sense the classroom state in real time, automatically collect and analyze the learning situation data, dynamically adjust the learning plan according to the course schedule and the individual learning situation of the students, and build an immersive interactive teaching environment. It has multiple functions such as pre-class guidance, classroom assistance, and after-school consolidation. It runs through the complete teaching chain, effectively makes up for the shortcomings of the traditional teaching mode, and promotes the transformation of teaching in the direction of intelligence and precision. Based on this background, this paper sorts out various application scenarios of AI agents in college classrooms, analyzes the practical obstacles encountered in the implementation of technology, and proposes feasible optimization countermeasures, in order to provide theoretical basis and practical ideas for the reform of digital teaching in colleges and universities.

2. Intelligent Agent Empowers the Core Value of Classroom Teaching in Colleges and Universities

2.1 Teaching Students in Accordance with Their Aptitude, to Achieve Personalized Teaching

Centralized teaching in large classes is still the mainstream teaching mode in domestic universities. Standardized teaching progress and unified teaching content are difficult to adapt to students' uneven learning level, and it is difficult to teach students in accordance with their aptitude. AI agent can improve this problem through the whole process of pre-class, in-class and after-class. The pre-class investigation can find out the students' foundation, capture their listening status in real time in the classroom, and continuously track the learning effect after class. It can also be used to integrate complete learning data such as students' correct answer rate, classroom participation, and knowledge weakness. Through real multi-dimensional learning data, teachers' teaching rhythm and the difficulty of explaining content can be flexibly adjusted. At the same time, according to the individual differences of students, the adaptive exercises and learning materials are pushed. Therefore, AI agent can effectively solve the limitation of single teaching in traditional classroom, and provide feasible technical support for the implementation of stratified and individualized education mode in colleges and universities.

2.2 Improve Classroom Interaction and Activate Classroom Vitality

The classroom of domestic colleges and universities is mainly based on the one-way teaching of teachers, and the teaching form is relatively solidified. The long-term indoctrination teaching method inhibits students' independent thinking, which leads to problems such as dull classroom atmosphere and insufficient interaction. The introduction of AI teaching agent can reconstruct the traditional

classroom structure and form a multi-teaching system in which teachers and students cooperate with intelligent tools. The agent can cooperate with the teaching schedule to set up discussion topics, arrange in-class exercises, and immediately answer students' questions. It can also improve the shortcomings of limited coverage and lack of personalized guidance in traditional teaching. Multi-agent collaboration can also build a peer-assisted learning scene, which can provide real-time interactive guidance in combination with students' learning situation. This interactive mode can fully mobilize students' enthusiasm for classroom participation, optimize the learning atmosphere in the classroom, help students absorb knowledge in the classroom, and consolidate the foundation of professional learning.

2.3 Improve the Teaching Evaluation System and Optimize the Teaching Closed-loop

At the present stage, the teaching evaluation of colleges and universities is still based on the unified assessment as the core basis, mainly relying on the final results such as the quality of homework completion and the final exam results to judge the students' learning effect, focusing too much on the learning results and ignoring the students' periodic growth and change. This single evaluation method is difficult to truly and comprehensively reflect the students' comprehensive learning level, and there is obvious one-sidedness. AI agent technology can effectively make up for the shortcomings of traditional evaluation system, continuously track the whole process of students' learning trajectory, and systematically collect and accumulate rich process learning data. By combining the dynamic process data with the traditional assessment results, a more three-dimensional and objective comprehensive teaching evaluation system can be constructed, which can effectively improve the inherent defects of the result-oriented model and enhance the scientificity and integrity of teaching evaluation.

3. The Core Application Scenarios of Agents in College Classroom Teaching

3.1 Pre-class Preview: Intelligent Guidance, Paving the Foundation of the Classroom

In the traditional pre-class preview link, students are often prone to the problems of unclear preview direction and inaccurate grasp of key points, and AI agents can better solve such problems. Agents can sort out the knowledge system of each chapter of the course according to the syllabus, refine the core content, and combine the students' own learning foundation to generate personalized preview planning. In addition, the agent also tests the quality of students' preview completion through online question answering, pre-class self-test, knowledge point punching and other forms, summarizes the common learning shortcomings of students in the preview stage, and forms the preview learning data and timely feedback. Teachers can combine the results of this learning situation analysis to adjust the classroom teaching content and teaching arrangement, optimize the key and difficult points, make the classroom teaching design more in line with the actual needs of students, and further improve the accuracy and effectiveness of classroom teaching.

3.2 In-class Teaching: Human-Machine Collaboration to Optimize Classroom Experience

AI agents can work with teachers to share the basic teaching work in the classroom. The theory of many professional courses is obscure and abstract. With the help of visual demonstration, agents show complex content intuitively, which reduces the difficulty of students' understanding. In the classroom, students can ask questions to the agent at any time, and the basic questions can be answered immediately. When encountering comprehensive problems, the agent can be summarized and submitted to teachers for processing, so as to prevent the accumulation of students' knowledge blind spots and combat their enthusiasm for learning. At the same time, the agent continuously captures students' listening status and classroom participation, prompts students who are distracted and in poor learning status, and simultaneously pushes the overall learning data to the background. According to these real-time feedbacks, teachers can flexibly adjust the rhythm of teaching and optimize teaching methods, so that the classroom content can better meet the current learning needs of students.

3.3 After-school Consolidation: Precise Empowerment, the Implementation of Individualized Teaching

Based on the whole process of learning data accumulated by the platform, AI agents can build a systematic and personalized after-school improvement plan. The tool can accurately judge the weak links of students' classroom learning, target and push supporting knowledge point learning resources and special consolidation training, and combine students' cognitive level and learning ability to set up after-school learning tasks in a hierarchical manner to achieve precise and differentiated after-school teaching guidance. At the same time, AI agents can provide 24-hour question answering services, effectively solve the learning problems encountered by students in the process of after-school review, guide students to sort out the knowledge context, summarize the problem-solving paradigm and learning logic, and build a systematic knowledge system. Long-term independent training and deep thinking can also effectively exercise students' independent inquiry ability and continuously improve their comprehensive learning literacy and independent learning ability.

4. The Practical Dilemma of Agent Application in College Classrooms

4.1 Lack of Technical Adaptability and Lack of Depth of Teaching Integration

Nowadays, although most colleges and universities introduce AI agent to assist teaching, there are obvious shortcomings in practical application. The existing teaching agents mostly rely on the transformation of general large models. The development process does not combine the professional knowledge framework and the teaching logic customization optimization, and the adaptability is weak, which is difficult to meet the needs of refined and personalized teaching.

Most colleges and universities only use agents to complete basic tasks such as answering questions, distributing exercises, and displaying courseware, and fail to integrate them into core education links such as curriculum design, classroom interaction, ability training, and curriculum ideological and political education. Shallow use only builds a basic human-machine collaboration framework, which

cannot fully release the potential of intelligent technology, and it is difficult to tap the value of deep education, so it cannot promote the systematic innovation of college teaching mode.

4.2 The Weakening of Education Standard Has the Risk of Technology Abuse

AI agent can simplify the teaching process and improve the effectiveness of education. It is a high-quality auxiliary means of teaching reform. However, teachers cannot be replaced by technology and always occupy the core position of education. Many colleges and universities put the cart before the horse when promoting intelligent tools, blindly pursue technology landing, forget the fundamental task of moral education, and weaken the leading role of teachers in the classroom. Some teachers hand over all the work of teaching, homework correction and answering questions to the agent, ignoring the emotional communication and value shaping function carried by the classroom. Excessive use of technology will destroy the humanistic background of the classroom; students rely on intelligent tools to sort out knowledge and solve problems for a long time, which is easy to form a passive learning mentality and lack the ability to study independently, which is contrary to the original intention of colleges and universities to cultivate comprehensive literacy and innovative thinking.

4.3 Teachers and Students Lack Digital Literacy and Adaptability Application Ability

At present, although AI agents have entered the classrooms of major universities, their teaching empowerment value has not been fully released. The lack of digital literacy and practical level of teachers and students is the core crux of hindering the deep implementation of technology. The construction of intelligent teaching and training system in existing colleges and universities is relatively weak, mostly scattered short-term lectures, and lack of long-term and systematic training programs. Many teachers fail to form a complete understanding of intelligent teaching, and it is difficult to combine their own disciplines to explore the application value of agents, and it is difficult to truly integrate technology into daily teaching. There are also problems at the student level. Many people are accustomed to relying on intelligent tools to solve problems and organize knowledge points. Over time, they are lazy in independent thinking and in-depth research, and their independent learning ability continues to decline. On the whole, the short board of teachers and students ' digital ability has greatly compressed the actual effect of AI agent service classroom teaching.

5. The Optimization Path of Intelligent Agent Empowering Classroom Teaching in Colleges and Universities

5.1 Optimize Technology Adaptation and Deepen the Integration of Teaching Scenes

In order to improve the problem of poor effect of general intelligent model adaptation subject curriculum and release the teaching value of AI agent, colleges and universities can link multiple subjects to customize and improve the existing model, jump out of the general development idea, and iteratively upgrade according to the classroom characteristics of different disciplines and talent training objectives, so as to improve the professional adaptation ability of the tool.

The overall optimization can be promoted synchronously from two paths: content resources and system platform: continuously expand and update the intelligent knowledge base, supplement academic achievements, teaching cases and industry norms in combination with professional characteristics and industry frontiers, and enhance the accuracy of subject counseling; to open up the data gap of various intelligent teaching platforms in the school, connect the intelligent campus, online classroom, resource base and learning situation management system, integrate all kinds of data of teaching, learning and educational administration, realize the exchange of data resources, and build a complete closed-loop integrated intelligent teaching service system.

5.2 Adhere to the Education Standard, Build A Benign Man-Machine Collaborative Ecology

All measures to carry out classroom intelligent transformation based on AI agents should return to the fundamental goal of education and education, and should establish the implementation idea of teacher-based and technology-assisted. The core work rich in humanistic guidance value, such as curriculum architecture design, classroom rhythm control, and students' comprehensive literacy shaping, can only be implemented by teachers. AI agents can only be used to share mechanical repetitive tasks such as answering questions, continuous monitoring of learning conditions, and statistical collation of teaching data. Clearly dividing the functions of both sides can not only give full play to the unique humanistic education role of teachers, but also give full play to the data processing advantages of intelligent tools, and can form a human-machine collaborative education system, so as to ensure the continuous, stable and high-quality promotion of the intelligent teaching mode in colleges and universities.

5.3 Strengthen the Cultivation of Literacy and Improve the Application Ability of Teachers and Students

Whether the AI agent can be deeply implemented in the classroom and continue to exert its teaching value depends on the overall digital literacy and tool practical ability of teachers and students. The information foundation and teaching practice experience among teachers are uneven, and standardized and unified training is difficult to adapt to the needs of differentiated improvement. Therefore, the training work should be based on the existing technical basis of teachers, hierarchical planning, classification, customized step-by-step growth program. For the student group, colleges and universities can conduct positive guidance according to multiple channels such as classroom infiltration, special lectures, and general education courses. It helps students to establish the cognition of rational use of intelligent tools, actively overcome the problems of thinking inertia caused by excessive dependence on technology and the weakening of independent inquiry ability, so that AI agent can truly become an effective auxiliary means to help autonomous learning.

6. The Conclusion and Foresight

AI agent is an important technical carrier to promote the digital transformation of colleges and universities. Relying on the advantages of personalized counseling and intelligent interaction, it alleviates the old problems such as the solidification of traditional classroom forms, the difficulty of implementing stratified teaching, and the lack of teacher-student interaction. The relevant practice of domestic universities is still in the exploratory stage, and has not yet formed a standardized application plan. There are many practical problems, such as poor adaptability of model disciplines, weakening of teachers' educational functions, potential safety hazards in teaching data, and insufficient digital operation ability of teachers and students. For the long-term development of smart education, colleges and universities need to adhere to the fundamentals of moral education, stabilize the core educational status of teachers, and continue to promote the deep integration and iteration of agents and subject classrooms. Construct a standardized human-machine collaborative teaching mechanism, avoid hidden dangers such as technology abuse, information leakage, and lack of humanistic education, and create a high-quality digital classroom with intelligent and efficient, personalized guidance and humanistic background.