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Feasibility Analysis and Path Exploration of AI Intelligent Agents Intervening in University Teaching: A Case Study of the "College Students' Career Planning and Employment Guidance"

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Abstract

In the context of the rapid development of artificial intelligence technology, AI agents are gradually penetrating into the teaching scenarios of higher education, promoting a profound transformation of teaching models. This paper takes the "College Students' Career Planning and Employment Guidance" course as the research object, based on the theories of educational informatization and intelligent teaching, systematically analyzes the practical feasibility of AI agents' involvement in university teaching, and explores the implementation paths from three dimensions: teaching objectives, teaching processes, and teaching evaluations. The research findings show that AI agents have significant advantages in personalized learning support, optimization of teaching resources allocation, and intelligent teaching evaluation, but still face challenges in data ethics, transformation of teacher roles, and technological dependence. This paper proposes a three-dimensional implementation path of "target reconfiguration - process integration - evaluation optimization", providing theoretical references and practical basis for the reform of university course teaching.

Keywords:

Artificial Intelligence; AI Agents; University Teaching; Career Planning Course; Teaching Reform

1.0 Introduction

Since the 21st century, new-generation information technologies represented by big data, cloud computing and deep learning have developed rapidly. Artificial intelligence has gradually moved from the laboratory to practical application scenarios and has triggered profound changes in multiple fields. Especially in recent years, technological breakthroughs represented by generative artificial intelligence have enabled AI systems to not only possess data processing capabilities but also be capable of content generation, logical reasoning and human-computer interaction, marking the entry of artificial intelligence into the "cognitive intelligence" stage.

In the field of education, the rapid development of artificial intelligence is reshaping the traditional teaching model. Traditional university teaching is centered around teachers' lectures, emphasizing the systematic and standardized transmission of knowledge. However, in the era of information explosion, this model has gradually exposed many limitations, such as lagging teaching content updates, single learning paths and difficulty in meeting students' individualized needs. The introduction of artificial intelligence provides a new possible path to solve these problems.

AI agents, as an important application form of artificial intelligence, have the capabilities of autonomous perception, decision-making and execution, and can continuously learn and optimize in complex environments. In the educational context, AI agents can not only serve as teaching auxiliary tools but also assume the roles of learning supporters, intelligent mentors and even collaborative teachers, thereby promoting the transformation of teaching models from "teacher-centered" to "human-machine collaboration".

As global higher education enters the stage of digital transformation, the deep integration of information technology and education has become an irreversible development trend. In recent years, China has continuously promoted educational informatization construction, from the "Education Informatization 2.0 Action Plan" to the "Smart Education" strategy, universities have gradually established a digital education ecosystem centered on online learning platforms, digital resource libraries and intelligent teaching systems.

However, from the actual operation perspective, current university teaching digitalization is mainly at the "tool level", that is, embedding information technology as an auxiliary tool into the traditional teaching process, but failing to truly achieve the reconfiguration of teaching structure and logic. For example, online courses are often just a simple replication of offline courses, lacking personalized learning support and intelligent feedback mechanisms.

In this context, introducing AI agents with autonomous interaction and decision-making capabilities can help break through the limitations of traditional digital teaching and achieve deep intelligence in the teaching process. AI agents can conduct real-time analysis based on learning data, dynamically adjust teaching content and strategies, thereby promoting the leap from "informationization" to "intelligentization" in higher education.

2.0 Theoretical Foundation and Research Framework

2.1 AI Agents and Intelligent Teaching

With the continuous evolution of artificial intelligence technology, AI agents have gradually become an important research object in the field of educational technology. Their application in teaching scenarios not only changes the functional attributes of traditional teaching tools, but also promotes the systematic reconfiguration of teaching models and learning methods. Therefore, it is necessary to systematically elaborate on AI agents and intelligent teaching from aspects such as concept definition, theoretical foundation, and mechanism of action.

AI agents are typically defined as intelligent systems that can achieve goals through perception, decision-making, and action in a specific environment (Russell & Norvig, 2021). Compared to traditional information technology tools, AI agents have a higher degree of autonomy and adaptability, and their core characteristics are mainly reflected in several aspects (Wooldridge, 2009). Firstly, autonomy enables them to complete tasks independently based on set goals in a less human intervention situation, such as generating personalized learning suggestions based on student learning data in teaching scenarios. Secondly, perception ability enables them to dynamically identify the learning status of learners through multiple sources of information such as learning behavior data and assessment results, providing data support for precise teaching. Thirdly, decision-making ability relies on machine learning and deep learning algorithms, enabling them to analyze and reason about complex problems and formulate corresponding teaching strategies, such as achieving intelligent matching of career paths in career planning courses. Finally, interactivity is based on natural language processing technology, allowing AI agents to have real-time conversations

with learners, simulate teacher-like communication scenarios, and significantly enhance the learning experience and participation. Thus, AI agents are no longer limited to a single information processing tool but have gradually developed into teaching participants with "like subjectivity", demonstrating significant theoretical value and application potential in the field of education.

Intelligent teaching is a teaching model supported by information technology, driven by data-driven and algorithm optimization, and achieving dynamic adjustment and personalized development of the teaching process. Its core lies in systematically optimizing teaching content, teaching process, and teaching evaluation through artificial intelligence technology (Zawacki-Richter et al., 2021; Bond et al., 2023). From the perspective of development history, intelligent teaching has generally gone through three stages: the first is the digital teaching stage based on multimedia technology and online courses, emphasizing the digital presentation of teaching resources; the second is the information-based teaching stage centered on learning management systems, achieving platformization and networking of the teaching process; the third is the current intelligent teaching stage supported by artificial intelligence technology, characterized by precise teaching through learning analysis and adaptive systems (Viberg, Hatakka and Mavroudi, 2022). During this evolution, AI agents have gradually become an important carrier of intelligent teaching. Compared to traditional teaching systems, the teaching model based on AI agents pays more attention to individual differences of learners, emphasizes the "learner-centered" teaching concept, promotes the transformation of teaching supply from standardization to individualization, and thus provides a new development direction for the innovation of higher education teaching models (Holmes and Tuomi, 2022).

The application of AI agents in teaching is not a simple technological addition, but a comprehensive practice based on multiple educational theoretical foundations. From the perspective of theoretical support, the constructivist learning theory emphasizes that learning is a process in which learners actively construct knowledge in a specific context, and teachers should provide supportive learning environments. The AI agent can assist learners in continuously adjusting their cognitive structures in real or simulated scenarios by providing personalized learning resources and immediate feedback, thus aligning with the core concept of constructivism that emphasizes "learner-centeredness". At the same time, the adaptive learning theory holds that teaching should be dynamically adjusted based on individual differences of learners, and the AI agent precisely achieves personalized recommendations for learning content and paths through real-time analysis of learning behavior data, providing key technical support for adaptive learning.

Further examination reveals that the learning analytics theory emphasizes understanding learning behaviors through the mining and analysis of learning data and optimizing teaching decisions (Viberg, Hatakka and Mavroudi, 2022; Ifenthaler and Yau, 2020). The AI agent can deeply process multi-dimensional data during the learning process, thereby providing teachers with scientific and precise teaching intervention bases. Additionally, the human-computer collaboration theory states that humans and artificial intelligence should form a complementary collaborative relationship (Holmes and Tuomi, 2022). In the teaching context, teachers mainly undertake responsibilities such as emotional support, value guidance, and complex decision-making, while the AI agent is responsible for data analysis, information processing, and technical support. Together, they jointly construct a "human-computer collaborative" teaching model (Zawacki-Richter et al., 2021). Thus, the integration of multiple educational theories provides a solid theoretical foundation for the effective application of AI agents in teaching.

2.2 International Trends in AI Development

The international research on AI agents mainly focuses on AI itself. This study mainly focuses on the Sort out and dynamic analysis of AI and education development.

First, the application of AI in the education field in the United States can be traced back to the 1950s. It utilizes the speed and storage capacity of computers for computer-assisted education. The United States emphasizes the coverage of AI education throughout all grades and across disciplines. It builds an open community of AI resources for

the basic education stage to promote the sharing and collaboration of teaching resources. According to statistics, currently about 30% of public schools have adopted some form of AI tools. These tools cover multiple aspects from curriculum design to student assessment. Some well-known school districts even established specialized groups to study how to better integrate AI technology to improve overall teaching effectiveness. For example, some school districts in California are experimenting with AI-based data analysis tools to identify low-performing students and provide additional support (Mie, 2024). However, there are still many challenges. On one hand, regarding data privacy and security issues, all parties need to remain highly vigilant. On the other hand, due to the rapid update and iteration of technology, some teachers may lack necessary training to effectively use these new tools.

Second, Singapore launched the "Smart Nation 2015 Plan" in 2006 and began to explore the application of AI in the education field. In 2025, it launched the Smart Nation Educator Fellowship program to cultivate a teaching talent pool with cutting-edge digital knowledge in the education field, thereby improving students' digital skills and better adapting to the era of rapid technological development (The Straits Times). However, in the field of AI education, data security and privacy protection is an issue that cannot be ignored. Students' personal information and learning data face greater risks of leakage (Qiu & Guo, 2023).

Third, in November 2023, the British Department of Education released the "Application of Generative AI in Education" report, elaborating on the position of using generative AI in the education field, including large language models such as ChatGPT. The United Kingdom released the "Educational Application of Generative AI Report" in 2023 , aiming to reduce the burden on teachers. Its teacher education system has benefited from various supports and has designed computer courses for children and adolescents. This experience is of great significance for studying AI education in China. However, the application of AI in the education field in the UK has issues such as inaccurate information, violation of academic integrity, neglect of ethical demands, and problems of data privacy and security.

Therefore, the integration of AI and education is also one of the research hotspots in recent years. Foreign researchers mainly combine AI application platforms and tools with university education, but rarely involve AI agents with university education. The limitations of foreign research are : most studies are based on commercial educational products, and the public education system has insufficient adaptability.

In conclusion, researchers at home and abroad have made AI agent research a hot topic in current research. Under the background of digital transformation, the research on AI agents and university teacher education work has also begun, but currently more research focuses on how AI combines with teaching, for example, teachers use generative AI products such as Xinghuo, Wenxin Yiyuan, and Douba to efficiently search for teaching resources, automatically generate lesson plans, and reduce their own burden, thereby devoting more time and energy to more valuable course design and student tutoring.

3.0 Feasibility Analysis of AI Agents Intervening in University Teaching

In the context of the continuous maturation of artificial intelligence technology and the continuous advancement of higher education digital transformation, the involvement of AI agents in university teaching has a relatively solid practical foundation. From an overall perspective, its feasibility mainly lies in multiple aspects such as technical support, teaching adaptability, and institutional environment, and presents a multi-dimensional collaborative development feature.

Firstly, from the technical perspective, the development of AI agents provides solid support for their application in university teaching. In recent years, breakthroughs in key technologies such as machine learning, deep learning, and

natural language processing have enabled AI systems to possess complex information processing and human-computer interaction capabilities. AI agents not only can efficiently process massive learning data but also can generate personalized learning suggestions based on data analysis results, achieving dynamic optimization of teaching content and learning paths. At the same time, relying on intelligent recommendation and knowledge graph technology, AI agents can integrate multi-source educational resources and build a dynamically updated teaching content system, effectively compensating for the lag in traditional teaching resource updates. Therefore, from the perspective of technical maturity and application capability, AI agents have already met the basic conditions for entering the university teaching scenario.

Secondly, from the teaching perspective, AI agents have a high degree of compatibility with university teaching needs. Currently, higher education is gradually transitioning from "teacher-centered" to "learner-centered", and higher requirements are placed on personalized teaching and precise guidance. However, due to the limitations of teacher-student ratio and teaching resources, traditional teaching models are difficult to meet the differentiated development needs of students. AI agents can provide differentiated learning support for students through continuous tracking and analysis of learner behavior data, such as personalized learning path recommendations, adjustment of learning progress, and targeted feedback, thereby effectively improving learning outcomes. At the same time, AI agents can enhance classroom interactivity through intelligent questioning, scenario simulation, etc., increase student participation, and provide continuous learning support after class, expanding the boundaries of teaching time and space. Therefore, in terms of teaching goals and teaching methods, the introduction of AI agents has a high adaptability.

Thirdly, from the management and institutional perspective, the continuous improvement of the foundation of higher education informatization provides a favorable environment for the application of AI agents. On the one hand, the national level has continuously promoted the digitalization strategy of education, and universities have generally established online teaching platforms and digital resource libraries, providing technical carriers for the embedding of AI technology; on the other hand, with the continuous improvement of teachers' information literacy, their acceptance of new technologies is gradually increasing, providing human support for the promotion and application of AI agents. In addition, the demand of educational administrators for improving teaching quality and efficiency has also promoted the introduction and application of intelligent teaching tools. Therefore, from the perspective of institutional guarantee and implementation environment, the involvement of AI agents in university teaching has practical feasibility.

However, it should be noted that the application of AI agents in teaching still faces certain challenges. Firstly, there are issues of data security and ethics, such as the collection, storage, and use of student learning data, which involve privacy protection and data governance, requiring the establishment of complete institutional norms; secondly, the issue of teacher role transformation, in the collaborative teaching mode of human-machine, teachers need to shift from knowledge transmitters to learning guides and designers, which puts forward higher requirements for their professional capabilities; thirdly, there is the risk of technology dependence, excessive reliance on AI may weaken students' autonomous learning ability and critical thinking. Therefore, in the process of promoting the application of AI agents, a balance should be sought between technological innovation and the essence of education.

Overall, the involvement of AI agents in university teaching has high feasibility in terms of technology, teaching, and institutional aspects, but its effective implementation still requires systematic optimization in terms of normative mechanisms, capacity building, and teaching design. By establishing a scientifically reasonable application path, it is expected to achieve a deep integration of artificial intelligence and higher education, and promote the innovation of teaching models.

4.0 Implementation Path of AI Intelligent Agents in Teaching

Based on the clear realization that the intervention of AI intelligent agents in university teaching is feasible, how to construct a scientific, systematic and operational implementation path has become a key issue for promoting its effective application. From the perspective of teaching system theory and in combination with the development logic

of intelligent teaching, the application of AI intelligent agents should run through the entire process of teaching goals, teaching processes and teaching evaluations, forming an integrated implementation path of "goal reconstruction - process integration - evaluation optimization", so as to achieve the innovative teaching model of human-machine collaboration.

Firstly, at the teaching goal level, it is necessary to restructure from "unified standard orientation" to "individual development orientation". Traditional university teaching goals are mostly centered on knowledge transmission, emphasizing uniformity and standardization. However, in the intelligent teaching environment, more attention should be paid to students' ability development and individual differences. By leveraging the data analysis capabilities of AI intelligent agents, a comprehensive diagnosis of students' learning foundation, interest characteristics and development needs can be conducted, thereby formulating a hierarchical and classified teaching goal system. For example, course goals can be divided into basic goals, developmental goals and improvement goals, and the goals can be continuously adjusted through dynamic data feedback. This process not only helps to enhance the specificity of teaching goals but also enhances the adaptability and flexibility of teaching, making teaching truly serve the individualized development of students.

Secondly, at the teaching process level, a "human-machine collaboration" integrated teaching model should be constructed. The effective application of AI intelligent agents does not replace teachers, but forms a complementary relationship with them to jointly optimize the teaching process. In the pre-class stage, AI intelligent agents can conduct learning diagnosis and data analysis to assess students' abilities and analyze their needs, and generate personalized learning suggestions to provide a basis for teaching design. In the in-class stage, teachers mainly undertake the responsibilities of guidance, explanation and emotional support, while AI intelligent agents provide real-time assistance, such as intelligent answering, case recommendations and scenario simulations, thereby enhancing the interactivity of the classroom and the depth of teaching. In the post-class stage, AI intelligent agents can continuously track students' learning situations, provide homework feedback, learning suggestions and expansion resources, achieving the continuity of learning support. This all-round integration throughout the pre-class, in-class and post-class stages helps to break through the time and space limitations of traditional classrooms and build a teaching system that emphasizes both continuity and individualization.

Thirdly, at the teaching evaluation level, it is necessary to shift from "result evaluation as the main approach" to "process and development equally important". Traditional teaching evaluation mostly relies on end-of-term examinations and other terminal evaluation methods, which are difficult to comprehensively reflect students' learning process and ability development. By leveraging the data collection and analysis capabilities of AI intelligent agents, a multi-dimensional and all-process evaluation system can be constructed. On the one hand, through continuous monitoring of learning behavior data, dynamic evaluation of the learning process can be achieved; on the other hand, combined with learning outcomes and ability improvement situations, a comprehensive evaluation result can be formed. At the same time, AI intelligent agents can generate personalized feedback reports based on evaluation data, providing targeted improvement suggestions for students, thereby achieving a positive cycle of evaluation and learning. This data-driven evaluation method helps to improve the objectivity and scientificity of evaluation.

In addition, during the implementation path promotion process, attention should also be paid to the construction of supporting systems. On one hand, it is necessary to strengthen teacher professional development by providing training and practice to enhance their ability to use AI intelligent agents to conduct teaching, enabling them to adapt to the new requirements of human-machine collaborative teaching; on the other hand, it is necessary to improve technical and institutional guarantees, including platform construction, data security management and ethical norms formulation, to provide a stable and reliable operating environment for the application of AI intelligent agents. At the same time, the tendency of "technological centralism" should be avoided, and the orientation should be based on educational goals to ensure that the application of technology serves the improvement of teaching quality.

Overall, the implementation path of AI intelligent agents' involvement in teaching should be guided by systematic thinking. Through the collaborative advancement of teaching goal reconfiguration, teaching process integration, and teaching evaluation optimization, a human-machine collaborative teaching model centered on learners can be constructed. On this basis, combined with institutional and technical guarantees, it can effectively promote the in-depth application of artificial intelligence technology in university teaching and promote the innovation of educational models.

5.0 Conclusion

In the context of the rapid development of artificial intelligence technology, AI intelligent agents are gradually becoming an important force in promoting the reform of higher education teaching. This paper takes the "College Students' Career Planning and Employment Guidance" course as the research carrier, starting from the theoretical basis and practical needs, systematically explores the feasibility of AI intelligent agents' involvement in university teaching and its implementation path. The research shows that AI intelligent agents, with their autonomy, data analysis capabilities, and intelligent interaction capabilities, have significant advantages in supporting personalized learning, optimizing teaching processes, and enhancing the scientificity of teaching evaluations, providing new technical support for the transformation and upgrading of traditional teaching models.

In terms of feasibility analysis, this paper conducts a systematic demonstration from the three levels of technology, teaching, and system. At the technical level, the maturity of artificial intelligence-related technologies provides a solid foundation for the application of AI intelligent agents in teaching; at the teaching level, it is highly compatible with the personalized teaching needs of universities, helping to improve teaching effectiveness; at the system level, the education digitalization policy and the university's informatization foundation create a favorable environment for its application. At the same time, the research also points out potential problems such as data security, teacher role transformation, and technology dependence, emphasizing that in the process of promoting application, rationality and prudence should be maintained.

In terms of the implementation path, this paper constructs a system framework of "goal reconfiguration - process integration - evaluation optimization". By reconfiguring teaching goals, a transition from unified cultivation to individual development can be achieved; by constructing a human-machine collaborative teaching model, the deep integration of teaching processes can be promoted; by optimizing the evaluation system, a transformation from result-oriented to a focus on both process and development can be realized. This path not only reflects the development trend of intelligent teaching but also provides an operational practical solution for university curriculum reform.

Overall, the introduction of AI intelligent agents is not only an update of teaching tools, but also a deep transformation of teaching concepts and teaching models. In the future, on the basis of strengthening empirical research, further exploration of its application effects in different disciplines and courses should be carried out, and relevant institutional and technical guarantee mechanisms should be improved to achieve the deep integration of artificial intelligence and higher education and continuously improve the quality of talent cultivation.

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