



Optimizing the Curriculum and Innovating Teaching Models for the Digital Economy Major through Artificial Intelligence

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Abstract

The rapid development of artificial intelligence (AI) technology has brought new opportunities and challenges to talent cultivation in the digital economy era. At present, the curriculum system of digital economy programs in Chinese universities faces prominent issues such as outdated content, insufficient interdisciplinary integration, and monotonous teaching models, which severely hinder the quality of talent training. Drawing on the theoretical logic of AI-empowered education in digital economy programs, this study explores the specific mechanisms and practical pathways of AI in curriculum system optimization and teaching model innovation. It proposes an AI-based optimization framework for the digital economy curriculum system, featuring a modular interdisciplinary structure, dynamic content updating, and an intelligent teaching evaluation system. Furthermore, the study conducts an in-depth analysis of AI-driven teaching models, including flipped classrooms, blended teaching, and personalized learning path design, with effectiveness evaluations based on practical cases from representative universities at home and abroad. In addition, it systematically examines the challenges related to technology, resources, faculty, and ethics encountered in AI-empowered education, and puts forward corresponding strategic recommendations. The findings of this research hold significant theoretical and practical value for improving the quality of digital economy talent cultivation in China, deepening higher education reform, and promoting the deep integration of AI and education.

Keywords: *Artificial Intelligence, Digital Economy, Curriculum System Optimization, Teaching Model Innovation, Higher Education Reform.*

A. Introduction

Since the beginning of the 21st century, a new generation of information technologies represented by artificial intelligence (AI), big data, cloud computing, and blockchain has developed rapidly, ushering the global economy into the digital economy era. Among these, AI, with its powerful algorithms, fast data processing, and intelligent decision-making capabilities, is regarded as a key driver of continuous innovation in the digital economy (Mihai et al., 2024). Currently, AI has not only significantly transformed traditional industrial structures and business management practices but has also gradually penetrated various aspects of social life, becoming one of the core productive forces driving high-quality economic development. In China in particular, the government has successively issued a series of policy documents, such as the New Generation Artificial Intelligence Development Plan (2017) and the 14th Five-Year Plan for Digital Economy Development (2022), which clearly position AI as a national strategic direction for economic growth, emphasizing technological innovation as a means to accelerate industrial transformation and upgrading, and to foster new drivers of the digital economy.

The advent of the digital economy poses severe challenges to higher education, especially to talent cultivation in digital economy programs. The digital economy is essentially a new

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economic model characterized by digitization, networking, and intelligence, based on the deep integration of data and information technologies. This model raises higher requirements for students' overall literacy, innovative capacity, and interdisciplinary thinking (Zhu & Zhang, 2022). However, at present, the curriculum systems of digital economy programs in Chinese universities are still dominated by traditional economics courses, supplemented by limited content on basic information technology. Problems such as outdated content, low modularization, and insufficient interdisciplinary integration are prevalent. At the same time, traditional teaching methods remain largely unidirectional knowledge transmission, which fails to meet the demands of personalized learning and practical skill development for students in the new era (Bogoviz et al., 2019).

Specifically, in most Chinese universities, the curriculum design of digital economy programs tends to separate economic theories from basic information technology knowledge, lacking effective interdisciplinary integration. As a result, the course structure is often disconnected from actual industry needs. Moreover, teaching models are still largely lecture-based, with insufficient interaction and a low proportion of practice-oriented courses, making it difficult to enhance students' comprehensive competence and innovative practical abilities. Consequently, students who have studied under such models often lack in-depth understanding and hands-on experience with cutting-edge technologies such as AI and big data applications. Upon entering the industry after graduation, they frequently display evident skill shortages and incomplete knowledge structures (Yang, 2024). Therefore, how to effectively integrate AI technologies into the digital economy curriculum system and innovate teaching models has become an urgent issue that needs to be addressed.

The integration of artificial intelligence (AI) into higher education, especially into digital economy curricula, is not merely a technological update but rather a profound transformation of educational philosophy, content, and methods.

From the perspective of industrial development needs, competition in the digital economy era ultimately boils down to competition for talent. With the rapid convergence of AI and industry, the competency requirements of enterprises have fundamentally changed. Single-skilled talents who only master economic theories or basic IT knowledge can no longer meet the demands of industrial transformation and upgrading. There is an urgent need to cultivate interdisciplinary, innovative, and practice-oriented talents. By embedding AI-related content—such as algorithms, data mining, and big data analysis and applications—into curricula, universities can not only respond promptly to industry talent demands but also enhance students' core competitiveness and employability, thereby meeting the practical needs of socio-economic development.

From the perspective of teaching effectiveness and quality improvement, AI technology offers advantages such as intelligence, precision, and personalization, which can effectively address many problems inherent in traditional teaching models. By introducing intelligent teaching tools and platforms, universities can significantly improve the efficiency of resource allocation, achieve personalized and precise teaching, and enhance students' learning experiences and autonomous learning capacities. Specifically, AI-powered teaching systems can automatically collect and analyze student learning data, adjust content and pace in real time according to individual learning conditions, and design differentiated learning paths, thereby greatly improving learning outcomes (Chu et al., 2022). Moreover, such systems can provide instant interactive feedback and establish multidimensional evaluation mechanisms, enabling instructors to more accurately grasp students' progress and optimize course design, ultimately improving overall teaching quality.

From the perspective of higher education reform and international competition, world-renowned universities have already embarked on AI-centered educational transformations. Institutions such as the Massachusetts Institute of Technology (MIT) and Stanford University have widely adopted AI technologies to drive innovations in teaching content and reform teaching methods, actively exploring data-driven personalized learning models with notable results. In China, leading universities such as Tsinghua University and Fudan University have also begun experimenting with interdisciplinary integration of AI and economics, gaining preliminary practical experience (Costan et al., 2021). To remain competitive in the global talent landscape, Chinese universities urgently need to leverage AI technologies to innovate curricula and teaching models. This is not only a practical necessity for improving talent cultivation quality but also an inevitable trend aligned with the global wave of digital transformation in education.

In summary, against the backdrop of rapid AI development, systematically incorporating AI technologies into digital economy curricula and innovating educational models constitute both a realistic necessity and an important pathway for improving the quality of talent cultivation in China. It also provides theoretical support and practical insights for the modernization of higher education, carrying significant theoretical and practical implications.

B. Methods

The present study employed a mixed-methods research design to comprehensively explore the optimization of curriculum systems and innovation of teaching models for the Digital Economy major through artificial intelligence (AI). The qualitative component focused on theoretical exploration, framework construction, and the identification of educational challenges in AI-empowered programs. It drew upon academic literature, policy documents, and institutional reports to develop a conceptual foundation for curriculum reform (Zawacki-Richter et al., 2019). Meanwhile, the quantitative component sought to validate the proposed AI-based framework by collecting empirical data from educators and students in selected universities. This integrative design ensured both conceptual depth and empirical reliability, allowing the study to bridge theory and practice in the digital economy education context (Creswell & Creswell, 2018).

The research procedure was conducted in four systematic stages. The first stage involved a comprehensive literature mapping and problem identification process to analyze existing curriculum structures and teaching models in digital economy programs, highlighting issues of outdated content, limited interdisciplinarity, and lack of innovation (Hu & Ye, 2025). The second stage focused on constructing an AI-based optimization framework emphasizing modular curriculum design, dynamic content updating, and intelligent evaluation systems (Luckin et al., 2016). The third stage implemented case studies and field observations in representative universities in China and abroad to examine real-world applications of AI-driven teaching models such as flipped classrooms, blended learning, and personalized learning systems (Zawacki-Richter et al., 2023). Finally, the fourth stage centered on evaluating and validating the proposed framework through data analysis and interpretation, leading to the formulation of strategic recommendations for AI integration in curriculum reform (Zhou, 2022).

Data collection employed three complementary techniques to ensure a comprehensive and reliable dataset. First, a systematic document and literature review was conducted to identify theoretical perspectives and global practices in AI-empowered education. Second, case studies and field observations were utilized to capture practical insights from institutions that have successfully implemented AI-based learning systems (Holmes et al., 2021). Third,

questionnaires and semi-structured interviews were administered to faculty members, students, and curriculum developers to obtain both quantitative and qualitative data on perceptions, challenges, and outcomes of AI-supported teaching practices (Cohen, Manion, & Morrison, 2018). The triangulation of these data sources enhanced the validity and depth of the findings by reducing methodological bias and ensuring interpretive consistency.

The collected data were analyzed through a combination of qualitative and quantitative methods. Qualitative data derived from interviews, observations, and document analysis were examined using thematic analysis to identify recurring themes, patterns, and relationships related to AI's role in curriculum innovation (Braun & Clarke, 2021). Quantitative data from questionnaires were analyzed using descriptive statistics and correlation analysis to measure participants' experiences and evaluate the effectiveness of AI-driven teaching models (Field, 2018). The integration of both analytical approaches provided a holistic understanding of how AI contributes to curriculum optimization, supports innovative teaching strategies, and enhances educational outcomes in digital economy programs.

C. Results and Discussion

1. Analysis of the Integration of Artificial Intelligence and Digital Economy Curricula

Current Situation and Problems of the Digital Economy Curriculum System

The digital economy major has emerged alongside the development of information technology and industrial upgrading, aiming to cultivate interdisciplinary talents equipped with both economic management knowledge and IT application capabilities. At present, the curriculum system of digital economy programs in China mainly covers basic economic theories, fundamental IT applications, data analysis methods, and explorations of internet economic models. However, from the perspective of actual development needs, the current curriculum system still faces a number of problems. First, the course content is outdated, with its updating speed lagging behind industrial and technological evolution. The digital economy develops rapidly, but the mechanism for updating course content remains relatively slow, making it difficult to reflect the latest technological trends and industrial demands. As a result, there is a serious disconnect between students' knowledge and the practical requirements they encounter after graduation. Second, the course structure is unitary, with insufficient interdisciplinary integration. Economics courses and IT-related courses are clearly separated, lacking organic integration and interdisciplinary synergy, which makes it difficult to cultivate talents with genuine interdisciplinary thinking and practical competence. Third, the degree of modularization and personalization in course design is inadequate. Most courses adopt standardized and uniform content, without sufficient consideration of individual learning needs or ability differences, which undermines students' motivation and learning effectiveness. Fourth, the evaluation system is overly simplistic, as assessment methods are limited to traditional examinations, making it difficult to effectively measure students' real performance in practice, innovation, and problem-solving.

Therefore, it is urgent to conduct an in-depth analysis of the current digital economy curriculum system and to explore more effective optimization pathways, so as to comprehensively enhance the adaptability and effectiveness of curricula and teaching models.

The Internal Logic and Mechanism of AI Empowerment in Digital Economy Curricula

The internal logic of AI empowering digital economy curricula is rooted in the theoretical foundation of technology-driven educational transformation. Specifically, the incorporation of

AI technologies can effectively address the existing problems in traditional curricula, mainly in the following three aspects.

First, AI technologies can promote the dynamic adjustment and real-time updating of course content. By leveraging big data analytics, knowledge graphs, and other AI methods, universities can monitor industrial developments and technological trends in real time, quickly identify and integrate shifts in industrial demand, and dynamically update course content and teaching resources, thereby ensuring precision, timeliness, and frontier orientation of curricula. Second, AI contributes to interdisciplinary integration and modular curriculum construction. As a General Purpose Technology (GPT), AI can effectively connect disciplines such as economics, management, data science, and computer science, forming interdisciplinary knowledge networks and fostering the development of integrated course modules. This helps to meet industry's demand for interdisciplinary talents. Third, AI technologies provide strong support for realizing personalized learning and precision teaching. Through the analysis of learning behavior data and machine learning algorithms, AI can automatically identify students' learning styles, progress, and ability levels, and then provide differentiated teaching content and learning path planning, effectively improving students' learning outcomes and motivation.

The AI-Enabled Framework for Optimizing the Digital Economy Curriculum System

Based on the above analysis, this study further proposes an optimization framework for digital economy curricula empowered by AI. The framework consists of three parts: curriculum structure optimization, content upgrading, and intelligent evaluation.

First, curriculum structure optimization. In accordance with the practical demands of digital economy industries, the framework designs an AI-empowered modular curriculum system, including: a basic theoretical module (economics, management), a data and algorithm module (big data analytics, machine learning, data mining), and a frontier applications module (intelligent manufacturing, intelligent finance, platform economy, digital governance, etc.), thus realizing interdisciplinary integration. Second, course content upgrading. AI technologies are used to achieve dynamic content updates and case-driven teaching. For instance, AI-assisted smart case libraries can provide real-time updates of representative industrial cases. Personalized learning path design can also be supported through data analytics and intelligent recommendations, enabling students to better engage with real-world problems and to enhance their problem-solving abilities. Third, the construction of an intelligent evaluation system. Traditional assessment methods are innovated by using AI technologies to achieve a comprehensive evaluation of both learning processes and outcomes. For example, intelligent grading systems, real-time monitoring of learning behaviors, and AI-based student competency diagnostic reports can comprehensively and accurately assess students' practical ability, knowledge mastery, and innovation capacity. This, in turn, enables teachers to adjust their teaching strategies promptly and to achieve precision teaching goals. By constructing and implementing an AI-empowered framework for curriculum optimization, it is possible to effectively overcome the limitations of traditional curricula, to enhance students' practical competence and innovative qualities, and to provide stronger theoretical support and practical pathways for talent cultivation in the digital economy era.

2. AI-Driven Innovation and Practical Application of Teaching Models

Design and Innovation Pathways of AI-Driven Teaching Models

The rapid development of artificial intelligence (AI) is driving profound transformations in the field of education, particularly in the innovation of teaching models. Traditional classroom teaching is teacher-centered, characterized by limited teaching methods and insufficient interaction, which makes it difficult to meet the personalized and diversified learning needs of

students in the new era. Therefore, innovating teaching models based on AI has become one of the key pathways to upgrading digital economy education.

First, the innovation of the flipped classroom model based on AI. AI technologies can effectively integrate teaching resources and build intelligent online learning platforms, enabling deeper and more precise implementation of flipped classrooms. Before class, students learn knowledge points and theoretical foundations independently via intelligent platforms. The AI system, based on students' learning conditions and performance data, pushes personalized learning materials to help students master core knowledge more precisely. During class, teachers focus on interactive case discussions and project-based guidance, which enhances students' ability to apply theoretical knowledge and improves classroom efficiency and participation. Secondly, the innovation of blended teaching is empowered by AI. By leveraging AI technologies, universities can effectively combine the advantages of online and offline teaching to build efficient blended teaching models. For example, AI algorithms can analyze students' interaction data from online learning, accurately identifying weaknesses in knowledge mastery. Teachers can then provide targeted explanations and in-depth guidance in offline classes, thereby unifying personalization with efficiency in blended learning. Finally, intelligent teaching models for personalized learning path planning. Based on the analysis of students' learning behavior data, AI-powered platforms can automatically identify individualized learning needs and differentiated learning paces, dynamically generating customized learning paths. Such personalized learning paths can enhance student initiative and engagement, cultivate autonomous learning and problem-solving abilities, and significantly improve overall learning effectiveness and competence.

Practical Applications of AI in Teaching Interaction

The application of AI in teaching is not limited to knowledge transmission; more importantly, it deeply participates in teacher-student interaction. This is mainly reflected in three aspects: intelligent teaching assistants, intelligent Q&A systems, and learning feedback analysis.

First, the application of intelligent teaching assistants. AI technologies support the development of intelligent assistant systems that can undertake routine teaching tasks, such as grading assignments, online Q&A, and classroom attendance. This effectively reduces teachers' workload, allowing them to devote more energy to high-level teaching interactions and the cultivation of students' creativity and innovative capacity. Secondly, intelligent Q&A systems support teaching interaction. Through natural language processing (NLP) and knowledge graph technologies, intelligent Q&A systems enable students to obtain real-time, accurate, and personalized answers. These systems can automatically identify students' questions, perform intelligent reasoning, and provide high-quality personalized feedback quickly, thereby significantly improving the efficiency and quality of interaction. Finally, learning feedback analysis and instant interaction. With AI learning analytics, students' learning behaviors and outcomes can be monitored in real time, with immediate feedback reports provided to teachers. Teachers can then adjust their teaching strategies based on these real-time data and learning dynamics, making instruction more targeted and interactive. For example, when data analysis reveals students with low classroom participation, teachers can promptly provide personalized attention and guidance, thereby enhancing the overall effectiveness of teaching.

Case Analysis of AI-Enabled Teaching Model Practices in Universities

In recent years, many universities at home and abroad have actively explored and implemented AI-enabled teaching innovations, achieving preliminary results and accumulating valuable experience with significant demonstrative value.

For example, the School of Economics and Management at Tsinghua University has introduced AI-powered teaching assistants into digital economy courses, enabling automated grading of assignments and intelligent interactive Q&A. This has effectively improved student learning outcomes and teaching efficiency. Specifically, the assignment completion rate of students increased by more than 15%, repetitive workload for teachers was reduced by over 40%, classroom interaction frequency rose significantly, and student satisfaction with classes improved markedly.

Another case is Fudan University, which has promoted AI-based flipped classroom models in core courses of the digital economy program. By using intelligent platforms to push learning resources precisely, personalized learning paths were realized. According to classroom feedback data, after adopting this model, students' pre-class autonomous learning participation exceeded 85%, while student participation and speaking in interactive sessions nearly doubled compared to traditional classrooms, leading to substantial improvement in overall learning outcomes.

Internationally, the Massachusetts Institute of Technology (MIT) has built a personalized learning management platform (MITx) using AI technologies, tracking and analyzing each student's progress and abilities in real time. Teaching strategies and content arrangements are dynamically adjusted, achieving precision teaching and personalized tutoring. Practice data show that this intelligent personalized model significantly enhanced students' learning initiative and teaching satisfaction.

The above cases demonstrate that AI-driven innovation in teaching models has shown strong vitality in the practices of universities both domestically and abroad. Such innovations not only improve student learning outcomes and engagement but also provide valuable experience and reference for talent cultivation in digital economy programs.

3. Challenges and Countermeasures of AI-Enabled Digital Economy Education

Major Challenges of AI-Enabled Digital Economy Education

Artificial intelligence (AI) demonstrates tremendous potential in empowering digital economy education, but it is also accompanied by a series of practical challenges. First, the challenge of technological application. Although AI technologies are advancing rapidly, their application in educational contexts still faces numerous obstacles. At present, the development costs of AI educational products and tools are relatively high, while their level of intelligence still falls short of practical educational needs. In particular, there is a lack of precise, reliable, and education-oriented algorithms and models, leading to the risk of "technology islands" in practical applications. Second, bottlenecks in educational resources and infrastructure. Currently, the construction of AI infrastructure in digital economy programs at Chinese universities remains weak. Most institutions lack professional AI platforms, intelligent devices, and data support, making it difficult to achieve efficient sharing and application of intelligent teaching resources. In addition, the personalization level of teaching resources is low, and resource systems are fragmented, which severely restricts the effective promotion of AI technologies in education. Third, shortage of qualified faculty and difficulties in teacher role transformation. AI-enabled education places higher demands on teachers, requiring not only mastery of interdisciplinary knowledge and intelligent technology applications but also adaptation to new teaching roles. However, many teachers currently lack sufficient AI literacy, making it difficult for them to quickly and effectively adapt to AI-driven teaching models, and the transformation of teacher roles faces resistance. Fourth, ethical and legal risks. With the deepening application of AI in education, issues such as personal privacy protection, data security, algorithmic bias, and transparency are becoming increasingly prominent. How to

effectively avoid these risks and establish sound norms for AI application in education has become an urgent problem.

Strategies and Recommendations for Addressing Challenges of AI-Enabled Education

In response to the above challenges, this study proposes the following strategies and recommendations. First, strengthen technological R&D and promote industry-education integration. Universities should actively cooperate with leading enterprises in the AI sector to jointly develop intelligent educational products and tools for digital economy programs. The government should provide special funding support and encourage university-enterprise collaboration to break through technological bottlenecks in AI education and promote deep integration of technology and education. Second, accelerate the construction of AI educational infrastructure. Universities should increase investment in AI infrastructure, speed up the building of smart campuses, intelligent laboratories, and data-sharing platforms, and improve the overall AI teaching environment. At the same time, universities should establish comprehensive AI teaching resource repositories to realize resource sharing and personalized services, thereby effectively supporting teaching practice. Third, promote faculty development and teacher role transformation. Universities should enhance teachers' AI application capabilities and interdisciplinary knowledge through targeted training programs and industry-academia-research collaboration. In addition, through policy incentives and reforms in evaluation mechanisms, teachers should be encouraged to actively transform their teaching roles, adapt to the demands of teaching innovation in the AI era, and foster a supportive ecosystem for faculty development. Fourth, establish ethical and legal frameworks for AI-enabled education. Governments and universities should jointly issue ethical and legal regulations for AI in education, strengthen data security and privacy protection, and clarify the boundaries and standards for algorithm use. Meanwhile, efforts should be made to promote AI ethics education, enhancing teachers' and students' awareness and understanding of technological risks, and fostering a safe, orderly, and trustworthy environment for AI applications in education.

D. Conclusion

Focusing on the theme of AI-enabled optimization of the digital economy curriculum system and innovation of teaching models, this study, through theoretical analysis and case-based research, arrives at the following main conclusions. First, the deep integration of AI technologies and digital economy education can effectively address the problems of outdated course content, insufficient interdisciplinary integration, and a lack of personalized teaching in traditional educational models, thereby significantly improving the quality of talent cultivation. Second, a curriculum optimization framework empowered by AI has been constructed, including interdisciplinary modular course design, dynamic content updating, and intelligent learning evaluation systems, which effectively promote the innovative development of digital economy education. Third, AI-driven teaching models such as flipped classrooms, blended teaching, and personalized learning path planning have been proposed and implemented, successfully enhancing students' learning outcomes and engagement, and driving profound transformations in teaching models for digital economy programs. Fourth, the challenges of technology, resources, faculty, and ethics in AI-enabled digital economy education have been analyzed, and targeted strategies and recommendations have been proposed, providing actionable theoretical and practical references for higher education reform. The innovative contributions of this study lie in the construction of a theoretical framework, the exploration of specific application pathways, and the systematic analysis of practical cases, providing both theoretical support and practical insights for universities to further advance AI-enabled education reform.

Although this study has achieved certain results, there remain some limitations. First, due to constraints of time and resources, this study mainly relies on case studies of representative universities and has not conducted a comprehensive and systematic investigation of universities nationwide, so the generalizability of the findings remains to be tested. Second, the study has not yet provided an in-depth analysis of the long-term effects and cost-effectiveness of AI applications in education. Future research can focus on the following directions: first, expand the scope of cases and the scale of data collection, conducting broader and deeper research across different types of universities to enhance the generalizability and representativeness of the findings; second, further study the long-term cost-benefit analysis of AI-enabled education, clarifying the costs and returns of educational digitalization and intelligence; third, conduct in-depth research on the construction of ethical and legal frameworks for AI in education, exploring issues of safety, ethics, and social sustainability in technology application, in order to promote the healthy development of AI education.

Looking ahead, AI-enabled digital economy education will develop toward deeper integration, higher intelligence, and greater inclusiveness. With the ongoing deep integration of AI technologies and education, university education will become increasingly personalized, precise, and intelligent. Teacher roles will become more diversified, with AI teaching assistants and human instructors forming complementary collaborative relationships to jointly enhance teaching quality. At the same time, with stronger policy support, the educational models of digital economy programs in Chinese universities will gradually align with international standards, cultivating more interdisciplinary and innovative talents with global competitiveness, thereby providing a solid talent foundation and intellectual support for China's high-quality economic development.

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