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Research on AI-Driven Data Science Curriculum Construction and Innovative Teaching Models based on the "New Economics and Management" Strategy

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ABSTRACT

In response to the demand for high-quality compound talents in the digital economy era, China's higher education system has gradually proposed and promoted the "New Economics and Management" (NEM) strategy, which aims to cultivate professional economic management talents with data thinking, technical application capabilities, and innovation abilities. With the rapid development of technologies such as artificial intelligence (AI), big data, and cloud computing, the current curriculum and teaching models urgently need to be optimized and innovated. This study aims to construct an AI-driven data science curriculum framework adapted to the digital economy era and propose innovative teaching models based on the NEM strategy, leveraging the advantages of AI technology. By analyzing the practical experience of domestic and international universities in AI and data science teaching, this study proposes a comprehensive curriculum design framework that deeply integrates economic management courses with AI technology and data science, and innovatively introduces modern teaching methods such as project-based learning (PBL), flipped classroom, and blended learning. The study shows that these innovative models not only enhance students' abilities in data analysis, technical application, and innovative thinking, but also, through the concept of interdisciplinary integration, make the curriculum content cover both traditional economic management knowledge and technical application abilities, effectively promoting the cultivation of compound talents. By continuously deepening the application of technology, strengthening the construction of teaching staff, and reinforcing practical teaching, future AI and data science courses will better meet the needs of the digital economy era and make greater contributions to cultivating high-quality compound talents with innovation and technical application abilities.

KEYWORDS

AI-Drive; Curriculum Construction and Innovative; Teaching Models; New Economics and Management Strategy.

1. INTRODUCTION

With the rapid development of technologies such as artificial intelligence (AI), big data, and cloud computing, industries across the globe are undergoing profound transformations, and the field of education is no exception. Particularly in the realm of economics and management, traditional teaching models and curricula are facing unprecedented challenges. To meet the demand for high-quality compound talents in the digital economy era, China's higher education system has gradually proposed and promoted the "New Economics and Management" (NEM) strategy, which aims to cultivate professional talents in economics and management with data thinking, technical application

capabilities, and innovation abilities (Feng, 2019; Wang et al., 2021; Ding & Jing, 2022; Zhou, 2019). This strategy not only responds to the impact of the technological revolution on management disciplines but also focuses on cultivating talents who can adapt to future societal and economic demands, thereby better serving the rapid development of the digital economy. However, despite some progress made in its implementation, the relevant curriculum and teaching models still have many shortcomings and urgently need further optimization and innovation.

Against this backdrop, the construction of AI-driven data science courses has become particularly important. With the vigorous development of the digital economy, the application of AI technology has gradually permeated various disciplines, and its importance in the field of economics and management has become increasingly prominent. Especially in cultivating students' abilities in decision analysis, intelligent management, and market forecasting, AI and data science technologies offer rich opportunities and challenges for teaching reform. Although some explorations have been made in the integration of data science and economics and management disciplines in higher education both domestically and internationally, there are still many problems to be solved in the deep integration of technology and curriculum content, as well as in the innovation of teaching methods (Gu & Hao, 2022; Li & Schleicher, 2024; Zhou, 2023).

This study aims to construct an AI-driven data science curriculum framework adapted to the digital economy era and propose innovative teaching models based on the NEM strategy, leveraging the advantages of AI technology. By analyzing the practical experience of domestic and international universities, this study provides theoretical support and practical guidance for teaching reforms in Chinese universities, helping them stay at the forefront of education reform driven by new technologies and cultivate high-quality compound talents for China's digital economy and intelligent management. The study will focus on exploring how to integrate technologies such as AI and big data into the curriculum system of economics and management, innovate curriculum design and teaching models, address issues such as insufficient integration of curriculum content and technology, lagging faculty team building, and loose combination of practice and theory, and enhance students' competitiveness in the fields of economics and management, data-driven decision-making, and intelligent market forecasting, thereby providing a solid foundation for the education reform of Chinese universities in the new era.

2. LITERATURE REVIEW

The NEM strategy is a key measure for China's higher education to respond to the digital economy era and the development of new technologies, especially in the construction of professional courses in economics and management, emphasizing the deep integration of technology and management disciplines. Research indicates that the traditional curriculum system can no longer meet the demand for talents in the digital economy era, and it is necessary to optimize and update the curriculum content by embedding modules of data science and intelligent decision-making to cultivate students' interdisciplinary thinking and technical application abilities (Feng, 2019; Wang et al., 2021). In terms of interdisciplinary integration, universities have introduced modules of data science and AI, promoting the transformation of traditional management disciplines (Ding, 2022). Regarding innovative teaching models, methods such as project-based learning (PBL), flipped classroom, and blended learning have been adopted, combining online learning with face-to-face teaching to strengthen the combination of theory and practice and enhance students' self-learning and innovation abilities (Wang, 2021; Zhou, 2019).

Teaching of AI and data science, as an important part of the NEM strategy, has become a hot topic in higher education reform. The application of AI technology in curriculum content, such as market analysis and intelligent decision-making, has enriched the content of economic management courses and enhanced the timeliness and practicality of the courses (Gu, 2022). AI-driven teaching methods, through personalized learning paths and intelligent means, have improved classroom interactivity and

the effects of personalized teaching (Wu et al., 2024). The application of AI in teaching assessment, through personalized analysis, helps teachers grasp students' learning progress and promotes the customization and refinement of courses (Li, 2023). Case teaching and practical teaching, such as Peking University's "Data Analysis and Management Decision-Making" course, have improved students' practical application abilities through real business cases and virtual laboratories (Zhou, 2023).

In summary, domestic and international research on the NEM strategy and teaching of AI and data science has achieved certain results, but there is still room for further development in the deep integration of technology and curriculum, innovation of teaching methods, and intelligent teaching assessment. Through the analysis of existing literature, it can be seen that the application of AI technology and data science in economic management courses has achieved preliminary results, and through means such as personalized learning, intelligent teaching, and practical teaching, the quality of teaching has been promoted. However, in terms of the depth of integration between technology and curriculum, faculty team building, and the effectiveness of practical teaching, universities still need to make further efforts in future teaching reforms.

3. THEORETICAL FRAMEWORK AND RESEARCH METHODS

The theoretical framework of this study is based on the NEM strategy, emphasizing the course design concept of fostering innovative abilities, integrating practical skills with theoretical knowledge, and promoting interdisciplinary integration. It aims to construct an AI-driven data science curriculum framework that meets the demands of the digital economy. In terms of research methods, a combination of instructional design and experimental research, questionnaire surveys, and teaching assessments is employed to comprehensively evaluate the implementation effects and the success of teaching innovations of the course. These research methods provide theoretical support and practical guidance for curriculum construction and teaching model innovation, which is conducive to promoting the in-depth implementation of the NEM strategy and offering valuable references for curriculum reform in higher education.

3.1. Theoretical Framework

This study constructs a theoretical framework for curriculum construction that meets the needs of the digital economy era and the development of AI technology based on the NEM strategy. The framework focuses on core elements such as fostering innovative abilities and integrating practical skills with theoretical knowledge, exploring how to introduce AI technology and data science into economics and management courses while promoting students' comprehensive development.

(1) Fostering Innovative Abilities. Fostering innovative abilities is one of the core goals of course construction under the NEM strategy. In the digital economy era, talents in economics and management not only need a solid theoretical foundation but also the ability to solve complex problems innovatively. This requires the education system to stimulate students' innovative thinking and interdisciplinary integration abilities through curriculum design. Specifically, this study believes that the introduction of AI and data science technologies can provide students with more innovative tools and methods. For example, technologies such as machine learning and data mining can help students propose innovative solutions when facing practical management problems. Therefore, it is necessary to integrate interdisciplinary knowledge systems into curriculum design and encourage students to exercise their innovative abilities through practical cases and project-based learning.

(2) Integrating Practical Skills with Theoretical Knowledge. Under the NEM strategy, the close integration of theoretical knowledge and practical skills is an important principle in curriculum design. While theoretical teaching is important, the key indicator of students' learning outcomes is their ability to apply theory to practice. This framework emphasizes the practicality and operability of curriculum

content, believing that the introduction of AI-driven data science technology can provide students with real industry data and business cases, thereby helping them apply their theoretical knowledge in simulated practical environments. For example, in AI-driven courses, students can analyze big data and build models to solve practical management problems, achieving seamless integration of theory and practice. Through teaching methods such as project-based learning (PBL) and flipped classrooms, students will participate in solving real business problems, further enhancing their practical abilities.

(3) Interdisciplinary Integration and Comprehensive Quality Improvement. The implementation of the NEM strategy requires interdisciplinary integration to cultivate economics and management talents with comprehensive qualities. The field of economics and management involves multiple areas, such as management, economics, information technology, and data science. Therefore, curriculum design should break through the boundaries of traditional disciplines and promote deep integration between disciplines. In this framework, interdisciplinary integration not only refers to the interdisciplinary content of the curriculum but also includes collaborative innovation in teaching methods and resource sharing. For example, integrating AI and data science technologies into economics and management courses can effectively enhance students' abilities in management, technology, and data analysis, cultivating compound talents with technical backgrounds, practical abilities, and innovative awareness.

3.2. Research Methods

This study employs a combination of qualitative and quantitative research methods to comprehensively evaluate the effectiveness of AI-driven data science curriculum construction and innovative teaching models under the NEM strategy. The specific research methods are as follows:

(1) Instructional Design and Experimental Research. To verify the application effectiveness of AI-driven data science courses under the NEM strategy, this study will first conduct instructional design and then assess the implementation effects through experimental research. Specifically, we will design an economics and management course that includes modules of AI technology and data science, covering basic knowledge points such as data analysis, machine learning, and intelligent decision-making, and integrate these modules into the traditional economics and management curriculum system. The experimental research will be conducted with students as subjects, using a group experiment approach: one group will follow the traditional teaching model, while the other group will learn using the AI-driven data science course. Finally, by comparing the differences between the two groups of students in terms of knowledge acquisition, practical skills, and innovative abilities, we will evaluate the teaching effectiveness of the AI-driven course.

(2) Questionnaire Survey. To gain an in-depth understanding of students' perceptions, learning experiences, and actual outcomes of the AI-driven data science course, this study will design and implement a questionnaire survey. The questionnaire will mainly cover the following aspects: students' understanding and mastery of course content, the application effectiveness of AI technology and data science in the course, problems and challenges encountered during course implementation, and changes in students' learning attitudes and interests. The survey targets will be students participating in the course experiment. By collecting students' feedback, we will further improve course design and teaching models.

(3) Teaching Assessment. Teaching assessment is one of the core components of this study. A comprehensive assessment method, including both formative and summative assessments, will be adopted. Formative assessment will primarily track students' learning progress and status in real-time through classroom observations, student feedback, and teacher evaluations, allowing for timely adjustments to teaching strategies. Summative assessment will comprehensively evaluate students' knowledge acquisition and practical skills through final exams, course projects, and teaching achievement presentations. In particular, in the AI-driven courses, we will focus on assessing students' practical application abilities in data analysis, model building, and intelligent decision-

making, and examine how students apply their knowledge to real economic management problems through project presentations and case analyses.

(4) Data Analysis and Statistical Methods. In the data analysis phase, this study will conduct quantitative analysis on questionnaire survey data, experimental data, and assessment results to explore the application effects of AI-driven courses among different learning groups and analyze the relationships between course content, teaching methods, and student learning outcomes. Additionally, qualitative data (such as student interviews and classroom feedback) will be combined for in-depth analysis to supplement the limitations of quantitative research, ensuring the comprehensiveness and scientific nature of the research results.

4. AI-DRIVEN DATA SCIENCE CURRICULUM CONSTRUCTION AND INNOVATIVE TEACHING MODELS

Under the framework of the NEM strategy, the construction of AI-driven data science courses fully integrates innovative curriculum design, practice-oriented teaching methods, and advanced teaching tools and platforms. Through innovative teaching models such as project-based learning (PBL) and flipped classrooms, the courses will help enhance students' hands-on abilities and innovative thinking. Additionally, intelligent assessment and feedback conducted through AI technology will further improve teaching quality. These teaching innovations will provide a solid foundation for cultivating compound economic management talents with data thinking, technical application abilities, and innovation capabilities.

4.1. Curriculum Design and Innovative Teaching Models

In the design of AI-driven data science courses, the content of the courses, the division of modules, and the setting of learning objectives are crucial. The design of the course will closely follow the goals of the NEM strategy, combining the needs of the digital economy and intelligent management to cultivate compound talents with data thinking, technical application abilities, and innovation capabilities. The curriculum design is as follows:

(1) Course Content and Module Division. The course content focuses on the basic knowledge of data science and AI technology and their applications in the field of economics and management, divided into five modules: Foundations of Data Science, Machine Learning and Intelligent Decision-Making, Big Data Analysis and Applications, Intelligent Market Forecasting and Optimization, and Practical Projects. The Foundations of Data Science module cultivates students' basic abilities in data collection, cleaning, processing, analysis, and visualization. The Machine Learning and Intelligent Decision-Making module explains basic algorithms to help students understand the supportive role of AI in economic management decision-making. The Big Data Analysis and Applications module introduces big data technologies and their applications in market analysis, consumer behavior research, and intelligent supply chain management. The Intelligent Market Forecasting and Optimization module enhances students' data-driven decision-making abilities by analyzing cases of AI applications in market trend forecasting and resource allocation optimization. After each module, practical projects related to real cases are arranged to encourage students to independently analyze and write reports using the learned AI tools and data science methods, thereby strengthening the integration of theory and practice.

(2) Learning Objectives. The learning objectives of the course are clear, aiming to enable students to deeply understand the basic principles of data science and AI technology and to proficiently master key technologies such as data analysis, machine learning, and intelligent decision-making through systematic study. The course focuses on cultivating students' abilities to apply AI technology for market analysis, resource optimization, and risk prediction in various business scenarios, thereby enhancing their data-driven economic management decision-making abilities. Meanwhile, the course

is committed to fostering students' interdisciplinary comprehensive qualities, enabling them to combine knowledge of economics and management with AI technology to solve complex business problems in their future careers and become compound talents with innovation and practical abilities.

(3) Innovative Teaching Models. To adapt to the AI-driven curriculum content, the course will innovatively design a variety of teaching models based on the NEM strategy. Firstly, project-based learning (PBL) will be adopted to enhance students' practical abilities and innovative thinking by having them solve economic management problems using AI technology in real projects, such as analyzing company sales data to forecast market trends or optimize inventory management. Secondly, the flipped classroom model will be implemented, where students independently learn theoretical knowledge through online learning platforms outside of class, and class time will be used for discussions, case analyses, and group collaboration to solve real problems, thereby enhancing students' participation and self-learning abilities. Finally, blended learning will be combined, with online platforms providing basic courses in AI and data science, and offline learning through group collaboration, classroom discussions, and case analyses to achieve complementary advantages between online and offline learning and improve teaching effectiveness.

(4) Teaching Resources and Tools Utilization. To support the AI-driven data science curriculum, the course has carefully selected a variety of teaching tools and platforms. In the field of machine learning and data analysis, students will learn to use Python and R for data cleaning, analysis, and modeling, while mastering Scikit-learn and TensorFlow, two mainstream machine learning libraries, for building classical machine learning algorithms and deep learning models. Additionally, the course introduces data visualization tools such as Tableau and Power BI to help students transform analysis results into intuitive charts and reports, enhancing their data presentation and communication skills. In terms of AI and data science platforms, the course utilizes Google Colab and Jupyter Notebook as online programming environments, facilitating students' coding, data analysis, and visualization. Meanwhile, by leveraging cloud computing platforms such as AWS, Google Cloud, and Microsoft Azure, students can access cloud computing resources for large-scale data analysis and AI model training. The course also establishes virtual laboratories and simulated environments, allowing students to conduct data analysis and market forecasting in simulated business scenarios, thereby enhancing their application and operational experience. The integrated application of these tools and platforms provides students with a comprehensive and practice-oriented learning experience, helping them master the core skills of AI-driven data science.

4.2. Integration of Teaching Content and Practice

Integrating theoretical knowledge with practical application is at the core of curriculum design. To help students better grasp the application of data science technology, the course will employ the following teaching methods:

(1) Classroom Interaction. In the course, instructors will engage students through question-guided discussions, real-time feedback, and group discussions, stimulating student thinking and participation. Through interaction, instructors can promptly understand students' comprehension levels, adjust teaching strategies, and ensure students master theoretical knowledge and can apply it in practice.

(2) Project-Based Learning (PBL). After each module, students will participate in projects based on real business cases. These projects, covering areas such as market analysis, consumer behavior analysis, and intelligent decision support, will require students to use AI technology to solve practical problems. Through project learning, students will apply their knowledge in real contexts, enhancing their practical skills and problem-solving abilities.

(3) Flipped Classroom. The course adopts a flipped classroom model, where students independently study theoretical content through an online platform before class, and class time is primarily used for discussions, case analyses, and problem-solving. This approach allows students to engage in deeper

thinking and discussion under the guidance of instructors, increasing their learning initiative and participation.

(4) Experimental Teaching Combining Practice and Theory. Experimental teaching will run throughout the course. By constructing real business environments or simulated scenarios, students will have the opportunity to apply theoretical knowledge in practical operations. For example, in the "Intelligent Market Forecasting" module, students will analyze historical sales data and use machine learning algorithms to predict future sales trends, proposing corresponding decision recommendations.

4.3. Teaching Assessment and Feedback

The application of AI technology in teaching assessment offers new opportunities to enhance teaching effectiveness and learning quality. In the course, AI technology will be used for teaching assessment and feedback in the following ways:

(1) AI-Driven Learning Analytics and Assessment. Through Learning Management Systems (LMS) and AI analysis platforms, student learning progress and classroom performance will be tracked in real-time. AI can analyze student learning behaviors, identify learning difficulties, and provide personalized teaching feedback to instructors. For example, if a student struggles with a particular topic, the system can automatically recommend supplementary materials to help improve their understanding and mastery.

(2) Combination of Formative and Summative Assessment. Formative assessment will be conducted throughout the learning process, using quizzes, classroom interactions, and project presentations to assess student learning outcomes in real-time and adjust teaching strategies based on student performance. Summative assessment will evaluate students' overall learning achievements through final exams, course projects, and case analyses.

(3) Intelligent Feedback and Personalized Learning Paths. Using AI technology, the course platform will generate personalized learning feedback and recommendations based on students' learning progress and outcomes, helping them identify strengths and weaknesses and optimize their learning paths. This not only improves learning efficiency but also enhances students' motivation to learn.

5. CONCLUSIONS AND FUTURE WORK

This study has constructed an AI-driven data science curriculum framework and deeply explored effective pathways for cultivating high-quality economic management talents under the guidance of the NEM strategy. A comprehensive curriculum design framework has been proposed, which integrates economic management courses with AI technology and data science in a deep manner, and innovatively introduces modern teaching methods such as project-based learning (PBL), flipped classrooms, and blended learning. These innovative approaches have not only effectively enhanced students' abilities in data analysis, technical application, and innovative thinking but also, through the concept of interdisciplinary integration, covered both traditional economic management knowledge and technical application skills in the curriculum content, thus strongly promoting the cultivation of compound talents. Additionally, the study has explored the application of AI in teaching assessment, optimizing students' learning experiences and enhancing the scientific nature and effectiveness of teaching assessment through data analysis and personalized feedback, which aids in the construction of personalized learning paths.

Although this study has provided a theoretical framework and practical guidance for the construction of AI-driven data science courses, integrating key elements such as interdisciplinary integration, data thinking, and technical application from the NEM strategy, and innovating curriculum design, teaching methods, and assessment tools, there are still many challenges and room for improvement

in the future development of AI and data science teaching models. Future directions include: further deepening the application of AI technology in the curriculum, promoting broader interdisciplinary integration, enhancing the interdisciplinary and technical application capabilities of the teaching staff, strengthening the combination of practical teaching with real cases, and improving AI-based intelligent assessment systems. The realization of these directions will face challenges such as updating curriculum content, building interdisciplinary teaching teams, updating teachers' knowledge, designing practical teaching, and data privacy.

In summary, by continuously deepening the application of technology, strengthening the construction of teaching staff, and reinforcing practical teaching, future AI and data science courses will better meet the needs of the digital economy era and make greater contributions to cultivating high-quality compound talents with innovation and technical application abilities.

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