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Strategies for AI-Empowered Economic and Management Experimental Teaching

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Abstract: The rapid advancement of artificial intelligence (AI) technologies has increasingly influenced higher education, particularly in transforming experimental teaching in economics and management. Traditional approaches often suffer from inefficiencies, delayed feedback and a lack of personalized support. The integration of AI offers an innovative pathway for enhancing experimental teaching. This study proposes a strategic framework comprising six key dimensions: intelligent resource support, hybrid virtual-real learning environments, personalized learning pathways, quality monitoring, assessment system reconstruction, and collaborative teaching mechanisms. The findings suggest that this framework has the potential to improve instructional efficiency, optimize learning experiences, and enhance educational outcomes. It offers both theoretical insights and practical guidance for integrating AI into experimental teaching in economics and management.

Keywords: artificial intelligence, economics and management, experimental teaching, teaching strategies, systematic framework

Introduction

Experimental teaching in economics and management is essential for developing students' practical skills and innovative thinking. It plays a central role in university talent development. However, traditional models often struggle with inefficiencies in resource allocation, monotonous instructional methods, and low teacher-student interaction. In the context of a rapidly changing economic environment, these models fail to meet the growing demand for interdisciplinary and application-oriented talents.

The rapid development of AI presents new opportunities for educational innovation, particularly in transforming experimental teaching. AI technologies such as big data analytics, natural language processing, and machine learning offer intelligent, personalized solutions for experimental teaching.

Some universities have already explored AI applications in experimental task generation, learning monitoring, and assessment feedback. However, most research has focused on STEM fields, with limited studies on AI strategies for economics and management experimental teaching. This paper aims to construct a systematic framework for AI-empowered experimental teaching in economics and management, clarifying the logic and collaborative pathways of each strategic dimension, and analyzing its effectiveness through case studies.

2. Theoretical Foundations and Literature Review

2.1 Evolution of AI-Enabled Experimental Teaching

AI's role in experimental teaching initially focused on task automation and resource management, including data

processing and instructional assistance. As deep learning and natural language processing have advanced, AI now supports more complex functions, including decision support, personalized learning pathways, and real-time feedback[1].

AI enables the analysis of large data volumes, offering precise support for experimental teaching in the social sciences. Through data mining and machine learning, AI can analyze student behavior and outcomes, providing actionable feedback for educators[2]. Moreover, AI can offer personalized learning content based on individual needs and predict learning behaviors to optimize the overall teaching process[3].

2.2 Research Gaps in AI Applications for Economics and Management

Although AI in experimental teaching has seen significant progress, most research has been concentrated in STEM education. Few studies have examined AI's applicability, strategic design, and empirical validation in economics and management. Moreover, existing research often focuses on isolated technologies rather than a comprehensive framework that integrates AI throughout the entire teaching process. There is a lack of research addressing how AI can enhance teaching efficiency, learning experience, and competency development in a multidimensional manner.

3. Systematic Strategy Framework for AI-Empowered Experimental Teaching in Economics and Management

Given the rapid development of AI, its integration into experimental teaching has become a key focus in higher education reform. This paper proposes a "Six-Dimensional Empowerment Strategy Framework," including: intelligent resource support, hybrid virtual-real environments, personalized learning pathways, quality monitoring, assessment system reconstruction, and collaborative teaching mechanisms. This framework provides a comprehensive path for optimizing experimental teaching, from resource preparation to instructional feedback.

3.1 Intelligent Resource Support System

AI enhances the efficiency and quality of resource acquisition, particularly in literature retrieval and knowledge structure construction. Through semantic search and cross-language matching, AI helps students and teachers access relevant literature quickly, overcoming language barriers. A dynamic literature recommendation system, based on course themes and research interests, delivers the latest academic developments, improving the relevance of teaching. Academic knowledge graphs help students understand the relationships between knowledge points, enhancing their cognitive structure.

3.2 Hybrid Virtual-Real Experimental Environment

Integrating real and virtual spaces is a key approach to AI-empowered experimental teaching. Digital twin technologies allow students to engage in simulations, such as market operations, business decision-making, and financial management, increasing interactivity and situational realism. For example, in a management sandbox course, students develop strategies, and the system compares their decisions with industry data, providing feedback to improve their models.

3.3 Personalized Learning Path Optimization

AI enables personalized teaching by analyzing student data and constructing individual ability models to identify knowledge gaps. Based on this analysis, the system generates experimental tasks tailored to students' levels, adjusting content and having difficulty to enhance motivation. Personalized feedback and structured experimental reports facilitate reflection and reduce the teacher's grading burden.

3.4 Quality Monitoring of the Teaching Process

AI also supports continuous monitoring and intervention throughout the teaching process. Natural language processing and emotion recognition algorithms analyze student communication and emotional states, detecting areas where students may need additional guidance. If significant pauses or emotional shifts are detected during group discussions, the

system prompts the teacher to intervene. Blockchain technology ensures traceability, recording students' actions and supporting accurate feedback.

3.5 Reconstruction of the Teaching Assessment System

Traditional assessment methods often focus on final grades, neglecting students' performance throughout the learning process. With AI, assessments become more comprehensive and dynamic. By integrating multi-source data, such as text, operational behavior, and learning trajectories, AI constructs multidimensional evaluation models that reflect students' abilities in knowledge acquisition, experimental operations, and cognitive development. AI not only automates grading but also generates personalized feedback, transforming assessments from "judgment" to "guidance."

3.6 Collaborative Teaching and Research Innovation Mechanism

AI promotes collaboration among teaching teams in course design and problem identification. By analyzing experimental data, AI can identify common errors and suggest content optimizations. For example, a university identified frequent student errors in panel data analysis and created a dedicated teaching module to address these issues, significantly improving teaching outcomes. Generative AI also aids in content creation, allowing teachers to generate case scenarios and reflective prompts, supporting flipped classrooms and inquiry-based learning.

4. Conclusion

The integration of AI into experimental teaching in economics and management shows significant promise in enhancing teaching efficiency, optimizing learning experiences, and improving educational outcomes. The proposed six-dimensional framework provides a comprehensive strategy for AI-empowered teaching. Although research is still in its early stages, with a focus on STEM fields, AI's role in economics and management teaching will likely expand as the technology matures.

This study offers both theoretical and practical guidance for advancing AI integration in economics and management education. Future research should empirically validate the framework's effectiveness, further enhancing AI's role in experimental teaching.

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