

Research on the Innovative Practice of AI-Empowered Curriculum Reform in Investment for Application-Oriented Undergraduate Programs

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Abstract: With the rapid development of artificial intelligence (AI) technology, the financial industry is undergoing profound transformations, posing new demands for the cultivation of application-oriented undergraduate investment professionals. Addressing issues such as the disconnect between teaching content and technology, the lack of personalized instruction, and a singular evaluation system in current investment courses, this paper constructs a comprehensive intelligent teaching framework spanning “pre-class, in-class, and post-class” stages, leveraging the Chaoxing Xuexi Tong AI platform. Through four pathways—curriculum content restructuring, teaching model innovation, evaluation system optimization, and resource repository construction—the study explores innovative practices in AI-empowered curriculum reform for investment. Teaching practice demonstrates that this model effectively enhances students’ learning interest, AI application capabilities, and practical investment skills, achieving a course satisfaction rate exceeding 97%. It provides a replicable implementation path for relevant curriculum reforms in application-oriented undergraduate institutions.

Keywords: Xuexi Tong; Artificial intelligence; Application-oriented undergraduate; Investment; Curriculum reform

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1. Introduction

The rapid advancement of artificial intelligence (AI) technology is profoundly reshaping the ecosystem of the financial industry. AI applications such as robo-advisory, quantitative investment, and algorithmic trading have extensively permeated all levels of the investment sector, leading to an explosive growth in demand for “AI + finance” composite talents by financial institutions. However, the investment curriculum, as a core arena for cultivating application-oriented investment professionals, faces the practical dilemma of teaching content lagging behind industry developments.

Current issues in teaching application-oriented undergraduate investment courses include: Firstly,

the disconnect between course content and technology. Teaching materials still emphasize traditional investment theories, with insufficient coverage of cutting-edge topics such as the applications of robo-advisory, quantitative trading, and machine learning in investment. This makes it difficult to reflect the latest developments in financial technology and creates a significant gap with the practical needs of “AI + finance” in local financial institutions in Chongqing. Secondly, the superficial application of Xuexi Tong’s AI functionalities. Existing teaching merely uses Xuexi Tong as a tool for resource distribution and assignment submission, failing to fully integrate its core functions such as intelligent profiling, virtual simulation, AI teaching assistants, and learning situation analysis into the entire teaching process, thus not fully leveraging the platform’s empowering value. Thirdly, the lack of personalized instruction. Significant differences exist among students in terms of financial foundation, mathematical ability, and learning style. The traditional “one-size-fits-all” teaching model struggles to meet the learning needs of students at different levels, resulting in uneven learning efficiency. Fourthly, a singular evaluation system. Assessment methods still focus on memorization of theoretical knowledge, lacking quantitative evaluation of practical dimensions such as the ability to apply AI tools and innovate investment strategies. The process data accumulated on the Xuexi Tong platform has not been effectively converted into evaluation criteria.

In response to these issues, this paper explores innovative pathways for AI-empowered curriculum reform in application-oriented undergraduate investment courses, leveraging the Chaoxing Xuexi Tong AI platform. It aims to construct a new curriculum form that deeply integrates “theory + technology + practice,” cultivating high-quality application-oriented investment talents suited to the demands of the digital economy era.

2. Theoretical foundations and design framework for AI-empowered curriculum reform in investment

2.1. Theoretical connotations of AI-empowered education

AI-empowered education refers to the use of digital technologies and information-based methods to drive educational development and innovation, providing students with a better learning experience and outcomes while facilitating teachers’ instruction and improving teaching quality. Developed from computer-assisted instruction theory, AI education theory’s core connotation is the integration of digital content with professional courses, utilizing AI technology to create intelligent learning environments that promote learners’ knowledge construction and ability development ^[1].

As a key technology in the transition of AI from computational intelligence to cognitive intelligence, knowledge graphs can connect different types of knowledge into relational networks, constructing visual and intuitive knowledge frameworks. Applying knowledge graphs to investment teaching can comprehensively enhance teaching effectiveness through learning resource recommendations, learning path planning, and knowledge point correlation analysis, enabling personalized student learning. AI teaching assistants can provide personalized learning support, automated assessments, and teaching resource management based on students’ learning habits and abilities, significantly improving teaching efficiency and quality ^[2].

2.2. Functional architecture of the Xuexi Tong AI platform

The Chaoxing Xuexi Tong AI workbench provides robust technical support for curriculum reform. Its core functions include: an intelligent tutoring system that pushes personalized learning resources based on student profiles; a knowledge graph module that structurally presents and correlates course knowledge points; an

AI teaching assistant capable of answering student questions in real-time and providing 24-hour learning support; a virtual simulation platform supporting practical projects such as quantitative strategy backtesting and robo-advisory operations; a learning situation analysis system that automatically collects student learning behavior data and generates multi-dimensional learning reports; and AI question generation and grading tools that enable intelligent assignment generation and automatic grading. These functions provide a technological foundation for the “pre-class, in-class, and post-class” intelligent reform of the investment curriculum.

2.3. Overall design framework for curriculum reform

Based on the functional characteristics of the Xuexi Tong AI platform, combined with the teaching objectives of the investment curriculum and the talent cultivation positioning of application-oriented undergraduate programs, a “four-dimensional integrated” reform framework is constructed. This framework focuses on cultivating students’ AI application abilities and practical investment skills, systematically advancing reform from four dimensions—curriculum content restructuring, teaching model innovation, evaluation system optimization, and resource repository construction—to achieve deep integration of “theory + technology + practice,” ultimately forming a replicable and promotable new curriculum form of “AI + investment.”

3. Innovative practice pathways for curriculum reform in investment

3.1. Curriculum content restructuring: Theory + AI applications + regional cases

To address the disconnect between course content and AI technology, the investment curriculum content has been systematically restructured, reorganizing teaching materials into the following three modules.

3.1.1. Core theory + AI applications

While retaining core theories such as portfolio theory, capital asset pricing model, and risk management, explanations of AI application scenarios in investment are added. Specifically, this includes combining portfolio optimization with Python quantitative implementation to guide students in understanding how to optimize asset allocation using machine learning algorithms; linking risk pricing theory with intelligent risk control logic by pushing micro-lecture videos on relevant AI algorithm principles through the Xuexi Tong platform; and integrating technical analysis theory with pattern recognition algorithms to demonstrate how AI automatically identifies K-line patterns. Each core knowledge point is marked with an “AI-related” label in the knowledge graph for intelligent recommendation by the system [3].

3.1.2. Practical skills + platform tools

Leveraging the virtual simulation module of Xuexi Tong and the college’s digital finance laboratory, practical content such as quantitative strategy backtesting, robo-advisory operations, and portfolio optimization is developed. Students can complete full-process practical training in data collection, strategy writing, backtesting analysis, and performance evaluation in a virtual environment. The Xuexi Tong AI assistant answers operational questions in real-time, and the system automatically records operational trajectories and generates practical reports.

3.1.3. Regional cases + policy implementation

In-depth exploration of local cases such as science and technology investment in Chongqing’s Western

Science City, emerging industry investment in the Liangjiang New Area, and green finance reform and innovation pilot zones is conducted to construct an exclusive case repository on Xuexi Tong. Case design follows the logical chain of “problem orientation–data support–strategy generation–effect evaluation,” guiding students to use AI tools to analyze regional economic data, design investment strategies, and evaluate investment effects, enhancing the course’s applicability.

3.2. Teaching model innovation: Full-process AI empowerment from pre-class to post-class

Leveraging the Xuexi Tong AI platform, a three-stage teaching model of “pre-class intelligent tutoring–in-class virtual-real integration–post-class precise coaching” is constructed, achieving intelligent reform throughout the entire teaching process.

3.2.1. Pre-class: AI profile-driven personalized preview

Before class, surveys and basic tests are distributed through Xuexi Tong, and the system automatically generates student intelligent profiles covering multiple dimensions such as financial foundation, mathematical ability, learning style, and interest preferences. Based on the profile results, AI pushes personalized preview packages to each student—animation micro-lectures and entry tests on basic investment concepts for students with weak foundations; cutting-edge literature on quantitative investment and extended cases for students with surplus capacity. Students can ask questions anytime through the AI teaching assistant during the preview process, and the system records question data to generate learning reports. Teachers log in to Xuexi Tong to view the reports, accurately grasp students’ common issues and individual differences, and adjust classroom teaching strategies in a timely manner^[4].

3.2.2. In-class: Virtual-real integrated interactive teaching

Classroom implementation follows a four-step teaching method of “situation creation–task-driven–practical verification–outcome presentation.” First, generative AI is used to create real investment situations, such as “designing a financing plan for a science and technology enterprise in Chongqing” or “constructing an industry rotation strategy based on macroeconomic data,” to stimulate students’ learning interest. Second, group tasks are assigned through Xuexi Tong’s grouping function, and students use AI tools to quickly retrieve information, analyze data, and form preliminary plans. Third, scheme verification is conducted relying on the virtual simulation system of the financial training platform, where students backtest strategy effects in the quantitative trading system, observe market reactions, and iterate and optimize upon discovering issues. Fourth, groups present project outcomes, and teachers use AI learning situation analysis tools to collect classroom interaction data in real-time, conducting instant assessments through forms such as required answers, quizzes, and voting. The AI system automatically generates visual reports on classroom participation and knowledge point mastery, providing a basis for teachers to adjust teaching pace.

3.2.3. Post-class: Knowledge graph-supported precise coaching

After class, students complete personalized assignments through Xuexi Tong, and the AI system intelligently selects questions of appropriate difficulty from the question bank based on classroom performance. After assignment submission, the AI teaching assistant automatically grades objective questions and provides scoring references and feedback suggestions for subjective questions. Based on assignment data and the

knowledge graph, the system accurately locates students' knowledge weaknesses and pushes targeted remedial learning resources—knowledge point explanation videos for students unclear on basic concepts; similar cases for repeated practice for students lacking application ability; and postgraduate entrance examination questions and academic papers for students with further study intentions. Teachers understand the overall class situation and individual differences through learning situation analysis reports and conduct stratified and categorized personalized coaching ^[3].

3.3. Evaluation system optimization: Multi-dimensional data-driven intelligent assessment

Traditional investment course assessments mainly rely on final written exams, which are difficult to comprehensively reflect students' AI application abilities and practical investment skills. This study constructs a multi-dimensional intelligent evaluation system of “process assessment (60%) + summative assessment (40%)” relying on the process data collection function of the Xuexi Tong platform.

3.3.1. Process assessment integrates multi-source data recorded by Xuexi Tong

Video learning duration reflects learning engagement, question bank completion quality inspects knowledge mastery, virtual simulation operation compliance rate measures practical skill level, group discussion participation evaluates team collaboration ability, and AI teaching assistant interaction frequency reflects proactive learning awareness. The system automatically generates a process evaluation radar chart for each student, visually displaying performance in each dimension ^[5].

3.3.2. Summative assessment adopts a combination of “AI-assisted grading + industry expert scoring”

Students receive comprehensive case tasks through Xuexi Tong, requiring the use of AI tools to complete investment strategy design, data analysis, and report writing. The AI system first conducts format checks and content plagiarism checks on the reports and gives basic scores based on scoring rules; financial institution experts are invited to review the strategy's innovativeness and practicality, and the AI synthesizes scores from both aspects to generate final grades. This evaluation method ensures both objectivity in scoring and reflects the guidance of industry standards.

3.4. Resource repository construction: Xuexi Tong exclusive “investment + AI” resource package

Integrating existing AI resources on Xuexi Tong and the college's digital finance laboratory, three major categories of resources are constructed to form an exclusive “investment + AI” resource package.

3.4.1. Video resource category

A series of micro-lectures on AI-empowered investment are produced, including modules such as “Python Quantitative Basics,” “Machine Learning Applications in Stock Selection,” and “Robo-Advisory Principles and Operations.” Each micro-lecture video is marked with associated knowledge points and difficulty levels for intelligent recommendation by the system.

3.4.2. Dataset category

Structured data such as historical data of the A-share market, industry financial data, and macroeconomic indicators, as well as unstructured data such as policy documents and research reports, are collected and organized to form a basic dataset supporting quantitative practical training.

3.4.3. Case repository category

Three major case groups are developed—classical theory verification cases, such as empirical testing of the CAPM model in the Chinese market; regional characteristic cases, such as investment value analysis of listed companies in Chongqing; and innovative application cases, such as short-term trading strategies based on public opinion analysis. Each case is accompanied by data, code, and operation guides to support students' independent exploration.

The resource repository supports a dynamic update mechanism. At the end of each semester, the latest industry data, job requirements, and competition regulations are obtained through web crawling technology, new knowledge points are automatically identified, and the resource repository is expanded to ensure that course content keeps pace with industry developments.

4. Practical results and reflections

4.1. Analysis of practical results

Through pilot applications in four classes of the Financial Management major, Grade 2022, at the school, the reform of the Investment course has achieved remarkable results.

4.1.1. Significant improvement in academic performance

The average score of the reformed classes is 76.4 points, which is 10.1% higher than that of traditional teaching classes (68.7 points). Particularly in practical questions involving quantitative strategy design and AI tool applications, the experimental classes scored 13.6% higher than the control classes, indicating a significant enhancement in students' practical abilities.

4.1.2. Marked increase in AI application skills

Through the course, 92.5% of students can proficiently use the Chaoxing Xuexi Tong AI tool for independent learning and problem exploration, while 86.3% can use Python or Power BI for basic financial data analysis, representing increases of 67.2 and 58.5 percentage points, respectively, compared to before the course. The number of awards won by students in subject competitions such as the Chongqing Undergraduate Business Innovation Competition (Financial Track) has increased by 15% compared to previous years.

4.1.3. Substantial increase in learning satisfaction

After the course, a questionnaire was distributed via Wenjuanxing, revealing that 95.8% of students believe that the AI-empowered teaching model has enhanced their learning interest and initiative, 93.7% like the knowledge graph feature, and 92.4% hope to continue using this teaching model. Student evaluations ranked the course in the top 5% of the college, with an achievement rate of course objectives at 88.6%.

4.1.4. Initial radiation effect of teaching resources

The “AI + Investment” resource package on Chaoxing Xuexi Tong has been promoted and applied in three financial courses at the school, accumulating over 200,000 visits. The reform experience has been shared and discussed at college teaching seminars, receiving widespread recognition from peers.

4.2. Reflections and prospects

Although the AI-empowered reform of the Investment course has achieved initial success, several noteworthy issues have emerged during practice. Firstly, the application of AI technology places higher demands on teachers’ digital teaching abilities, with some teachers lacking in-depth mastery of Chaoxing Xuexi Tong’s AI functions, necessitating targeted training. Secondly, the accuracy and bias issues of AI algorithms may affect the precision of learning assessments and content recommendations, requiring teachers to review and approve AI-generated content. Thirdly, reliance on technical equipment and network connectivity may limit the user experience for some students, necessitating alternative learning solutions to ensure educational equity.

Future research can be deepened in the following directions: Firstly, explore deeper integration of AI technology with the Investment course, constructing a “multi-spectrum integration” of ability graphs, problem graphs, and knowledge graphs. Secondly, develop course-specific intelligent agents to achieve more precise personalized learning navigation. Thirdly, promote reform experiences to other related courses, forming a systematic plan for constructing an “AI + Finance” course cluster. Fourthly, strengthen school-enterprise collaboration by introducing real industry data and business scenarios to further enhance the job adaptability of talent cultivation.

5. Conclusion

This article addresses issues such as the disconnection between teaching content and technology, the lack of personalized teaching, and a single evaluation system in the Investment course for applied undergraduate programs. Leveraging the Chaoxing Xuexi Tong AI platform, it explores innovative paths for AI-empowered course reform from four dimensions: course content reconstruction, teaching model innovation, evaluation system optimization, and resource library construction. Practice has shown that this model effectively enhances students’ learning interest, AI application skills, and investment practical abilities, with a course satisfaction rate exceeding 97%. The research findings hold significant theoretical value and practical implications for promoting the digital transformation of related courses in applied undergraduate institutions and cultivating high-quality investment talents suited to the demands of the digital economy era. Against the backdrop of rapid iteration of artificial intelligence technology, the continuous deepening of the integration and innovation of AI with course teaching will be an important direction for future higher education teaching reforms.

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Disclosure statement

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