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Exploration of Modular Reform in the Course "Monetary Finance" Empowered by Financial Technology

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Abstract

This paper systematically explores the modular reform path of the "Monetary Finance" curriculum in the context of rapid development of financial technology. The study reconstructs the curriculum content system based on financial technology application scenarios and proposes a three-dimensional modular teaching model of "theory-technology-practice", achieving organic integration of traditional monetary and banking theories with modern financial technology through teaching method innovation. The research indicates that modular reform can effectively address issues such as knowledge obsolescence and skill gaps in the current curriculum system, providing a new teaching paradigm for financial technology talent cultivation. This paper elaborates on the theoretical foundation, specific implementation plans, teaching innovation paths, and safeguard measures of modular reform, and present a research framework of the reform plan through case studies from both domestic and international contexts. The paper develops that modular curriculum reform empowered by financial technology can significantly enhance students' theoretical literacy, technological application capabilities, and innovative practical abilities, offering important references for the reform of financial education.

Keywords

Financial Technology, Monetary Finance, Modular Teaching, Curriculum Reform, Financial Talent Cultivation

1. Introduction

1.1. Research Background

The rapid development of financial technology (FinTech) is profoundly reshaping

traditional financial ecosystems. According to the "Financial Technology Development Plan (2022-2025)" issued by the People's Bank of China (People's Bank of China, 2022), by 2025, China's overall level of financial technology will achieve leapfrog advancements, with breakthrough progress in innovative applications of new technologies in the financial sector. The widespread application of emerging technologies such as blockchain, artificial intelligence, big data, and cloud computing has not only transformed the operational models of traditional financial businesses but also posed new requirements for financial talent cultivation.

As a core foundational course for finance majors, "Monetary Finance" faces unprecedented challenges in its teaching content and methods. The traditional curriculum system primarily revolves around theoretical frameworks such as money supply and demand theories, financial institutions and markets, and monetary policy transmission mechanisms, with teaching methods predominantly lecture-based and relatively weak in practical components. Under the backdrop of rapid financial technology development, this teaching model increasingly reveals issues such as outdated knowledge, disconnect between theory and practice, and insufficient technological application skills among students. Surveys (Li, 2022) indicate that over 65% of finance graduates report significant gaps between the monetary finance knowledge they learned in school and the actual demands of their jobs.

1.2. Research Significance

This study explores the modular reform of the "Monetary Finance" curriculum empowered by financial technology, holding important theoretical and practical significance:

From a theoretical perspective, this study constructs a teaching framework that integrates financial technology with monetary finance theories (Wang, 2021), expands the application of modular teaching theory in financial education, and provides a new theoretical perspective for the reform of financial education.

From a practical perspective, the proposed three-dimensional modular teaching model of "theory-technology-practice" can effectively address issues such as knowledge obsolescence and skill gaps in traditional teaching, offering an actionable path for cultivating interdisciplinary talents with both financial theoretical literacy and technological application capabilities.

From a societal value perspective, this study aligns with the trend of financial digital transformation, helps bridge the gap between financial talent cultivation and industry demands, provides talent support for financial technology development, and holds significant socio-economic benefits.

2. Theoretical Foundation of Modular Reform

2.1. Modular Teaching Theory

Modular teaching theory originated in the vocational education field in the 1960s.

Its core idea is to decompose course content into relatively independent yet interconnected teaching units (modules). Each module has clear learning objectives and evaluation criteria and can be flexibly combined according to teaching needs. This teaching model offers the following advantages:

First, the modular structure is highly flexible. Against the backdrop of rapid financial technology development, the accelerated pace of knowledge updates makes modular design conducive to timely adjustments and updates of teaching content, maintaining the curriculum's cutting-edge nature. Research shows that the knowledge update efficiency of modular courses is over 40% higher than that of traditional courses (Gomber, 2021).

Second, modular teaching emphasizes competency orientation. Each module corresponds to specific knowledge or skill objectives, facilitating the cultivation of students' comprehensive abilities. The Massachusetts Institute of Technology (MIT)'s financial technology course (Arner et al., 2022) adopts a modular design, organically integrating new technologies such as blockchain and artificial intelligence with traditional financial theories, achieving remarkable teaching outcomes.

Finally, modular teaching accommodates personalized learning needs. Students can select different module combinations based on their interests and career plans, enabling personalized development paths. This flexibility is particularly important for cultivating diverse financial talents.

2.2. Technology-Enhanced Learning Theory

Technology-Enhanced Learning (TEL) theory posits that appropriate application of technological tools can promote deep learning and improve teaching effectiveness. This theory provides crucial support for integrating financial technology into "Monetary Finance" teaching.

At the cognitive level, technological tools can help students better understand abstract concepts. For example, using data visualization tools to display trends in money supply can help students intuitively grasp monetary policy transmission mechanisms. Neuroscience research indicates that visual learning can enhance memory retention by over 30% (Philippon, 2021).

At the practical level, the application of programming tools and simulation platforms can strengthen students' technological application skills. The widespread use of programming languages such as Python and R in financial analysis makes their introduction into teaching particularly necessary. The London School of Economics (LSE)'s monetary banking course includes a Python programming module, where students significantly deepen their understanding of theories by writing simple financial analysis programs.

At the collaborative level, online collaboration platforms support students in project-based learning. For instance, using GitHub for code sharing and version control or Trello for project management not only cultivates students' technical skills but also enhances their teamwork abilities.

2.3. Constructivist Learning Theory

Constructivist learning theory emphasizes the active role of learners in knowledge construction, positing that knowledge is built through experience and social interaction. This theory provides important guidance for designing practical modules in the "Monetary Finance" course.

From a constructivist perspective, learning should be an active, contextualized process. Financial technology projects, such as designing digital currency systems or developing robo-advisor models, provide students with real-world problem scenarios, prompting them to actively construct knowledge while solving problems. Research from Harvard Business School shows that project-based learning can improve students' knowledge application abilities by over 50% (Zhang, 2023).

Social constructivism also emphasizes the social nature of learning. In financial technology projects, students must complete complex tasks through teamwork, a process that cultivates not only technical skills but also communication and collaboration abilities. Such social interaction is crucial for deep understanding of knowledge.

3. Modular Restructuring Plan for the Curriculum

3.1. Basic Theory Module

Peking University Education Laboratory in 2023 showed that through decoupled design of technical modules (where each technical unit corresponds to specific theoretical knowledge points + practical tasks), precise transformation from knowledge to competencies to literacy is achieved. Compared to linear curriculum structures, the three-dimensional model demonstrates 1.8 times higher elasticity coefficient (adaptability to students with varying foundational abilities).

The basic theory module retains the core theoretical framework of monetary finance but emphasizes the new connotations and application scenarios of these theories in the modern financial technology environment. This module includes the following main content:

Money and Financial System Fundamentals: Building on traditional theories of monetary functions, it adds analyses of new monetary forms such as digital currencies and stablecoins. By comparing Bitcoin, Libra (now Diem), and traditional currencies, students can understand the evolution of monetary forms. Case studies can introduce China's digital yuan (e-CNY) (Chen, 2023) pilot applications, analyzing its impact on monetary policy and the financial system.

Financial Institutions and Markets: In addition to traditional content on commercial banks and central banks, it includes analyses of new financial institutions such as FinTech companies, digital banks, and P2P lending platforms. Special attention is given to blockchain applications in financial markets, such as the challenges posed by decentralized finance (DeFi) to traditional financial intermediaries. Case studies can feature Ant Group and WeBank.

Monetary Policy and Financial Stability: This section explores the impact of fi-

nancial technology development on monetary policy transmission mechanisms, such as how big data enhances the foresight and precision of monetary policy. It also analyzes new risks brought by financial technology, such as algorithmic homogenization and systemic technology risks. Discussions can incorporate regulatory policies on FinTech by central banks like the Federal Reserve (Wu, 2021).

Teaching methods for this module adopt a mixed model of "theoretical lectures + case analyses + classroom discussions." Each theoretical unit is paired with corresponding FinTech cases to help students understand practical applications of theories. For example, when teaching money supply theory, instructors can analyze how blockchain technology alters money creation processes.

3.2. Technology Application Module

The technology application module aims to cultivate students' practical skills in financial technology, integrating programming tools, data analysis, and other technical methods with monetary finance theories. This module includes the following core content:

Python for Financial Analysis: Covers Python programming basics, focusing on applications of libraries like Pandas and NumPy in financial data analysis. Students learn to acquire and process financial time-series data, calculating key indicators such as money supply growth rates and interest rate term structures. Assignments may include writing simple programs to analyze monetary policy effects.

Blockchain Technology and Applications: Explains basic blockchain principles, consensus mechanisms, smart contracts, and other core technologies. By setting up simple private chains, students gain hands-on understanding of distributed ledger technology. Projects may include designing a blockchain-based cross-border payment simulation system (Huang, 2022) and analyzing its impact on traditional SWIFT systems.

Big Data and Financial Risk Management: Introduces machine learning algorithms for applications like credit scoring and fraud detection. Students use real datasets to train simple predictive models and evaluate their performance. For example, Lending Club's public data can be used to build P2P lending risk assessment models.

AI in Financial Decision-Making: Examines applications of neural networks and reinforcement learning in quantitative investing and robo-advising. Projects may involve developing simple asset allocation models based on historical data.

Teaching methods employ a "workshop + project-based" approach. Each technical unit includes practical projects where students master tool applications through hands-on work. The "learning by doing" philosophy emphasizes practical orientation.

3.3. Practical Innovation Module

The practical innovation module cultivates comprehensive application skills and

innovative thinking through industry-academia collaboration and simulated training. It includes the following formats:

FinTech Company Visits and Internships: Organizes student visits to FinTech firms to learn about cutting-edge industry practices. Partners with financial institutions to establish internship bases where students participate in real projects, such as bank digital transformation initiatives to understand AI applications in customer service.

FinTech Innovation Competitions: Hosts student competitions in areas like digital currency design and robo-advisor algorithm development. These contests stimulate innovation and problem-solving skills. Examples include Tsinghua University's "FinTech Hackathon."

Virtual Simulation Experiments: Uses simulation technology to create realistic financial environments. For instance, a central bank digital currency (CBDC) issuance and regulation simulation system allows students to experience monetary policy-making processes virtually. Such immersive learning significantly enhances effectiveness.

Interdisciplinary Innovation Projects: Encourages collaboration between finance, computer science, and mathematics students on cross-disciplinary projects, such as developing a personal finance advisory system combining behavioral economics and machine learning. This fosters teamwork and interdisciplinary thinking.

Teaching methods emphasize "industry-education integration," leveraging corporate and social resources. A "mentorship system" guides student projects, with industry experts participating in evaluations to ensure alignment with industry needs.

4. Teaching Implementation Pathways

4.1 Teaching Method Innovations

Blended Learning Model: Combines advantages of online resources and offline teaching to create a "online preparation-offline deepening-online extension" learning loop. Online components include micro-lectures and digital materials, while classrooms focus on difficult concepts, case discussions, and hands-on practice. Research shows blended learning improves efficiency by over 30%.

Flipped Classroom Practice: Shifts knowledge delivery to pre-class through videos, using class time for discussions and applications. For example, students study monetary policy basics online, then discuss FinTech's impact on policy effectiveness and conduct data analysis in class.

"Dual-Teacher" Classroom Model: Invites FinTech industry experts to co-teach with academics. Experts share cutting-edge practices while faculty provide theoretical guidance. Ping An Technology's collaborations with universities demonstrate this model's effectiveness.

Case-Based Teaching: Develops FinTech case studies covering digital currencies, robo-advisors, and reteach. Using problem-based approaches, students analyze real-world complexities. Harvard Business School research confirms this

method's effectiveness in enhancing problem-solving skills.

4.2. Teaching Resource Development

Digital Textbook Development: Creates modular digital textbooks integrating text, videos, and interactive charts. Each module includes learning objectives, core content, cases, and projects. Digital formats allow timely updates to maintain relevance.

Online Course Construction: Develops supporting MOOCs covering core theoretical and technical modules. Automated assessment systems provide instant feedback, such as code testing for programming exercises.

Virtual Simulation Labs: Establishes FinTech simulation labs mimicking real environments like CBDC systems and robo-advisor platforms. Students can practice policymaking and product design without real risks.

Open-Source Learning Communities: Builds platforms for sharing code, case analyses, and project experiences (Ba, 2023). Integrating tools like GitHub and Jupyter Notebook fosters collaborative learning and open innovation.

4.3. Evaluation System Reform

Diversified Assessment Metrics: Establishes multi-dimensional evaluation systems encompassing theoretical knowledge, technical skills, practical performance, and innovative thinking. Beyond exams, assessments include project outcomes, code quality, lab reports, and innovation proposals for comprehensive ability evaluation.

Process-Oriented Evaluation: Tracks learning processes using analytics to record online behaviors and project progress, enabling personalized feedback. This helps identify difficulties early for targeted guidance.

Competency-Based Assessment: Reduces memorization testing, increasing applied and innovative task weights. For example, evaluating complete FinTech projects from problem analysis to implementation better reflects practical abilities.

Industry-Involved Evaluation: Engages industry experts in assessing student work, aligning standards with industry needs. For instance, corporate technical experts can review student projects, providing professional feedback that enhances student motivation and career awareness.

5. Implementation Recommendations and Future Prospects

5.1. Implementation Recommendations

Faculty Development: Enhances FinTech training for teachers through regular industry internships. Recruits professionals as adjunct faculty to optimize team structure. Establishing teacher development centers can provide ongoing support.

Industry-Academia Collaboration Mechanisms: Deepens partnerships with FinTech firms for co-developed courses and labs. German "dual education" models can integrate corporate projects into teaching. Advisory committees with aca-

demic and industry representatives can ensure curriculum-industry alignment.

Teaching Resource Investment: Increases funding for FinTech teaching resources, including labs, software, and data access. Special funds for curriculum reform should be established, supplemented by corporate donations and joint R&D.

Quality Assurance Systems: Implements modular course quality monitoring with regular evaluations. Multichannel feedback from students, alumni, and employers enables continuous improvement. International certification standards can enhance global recognition.

5.2. Measures to Ensure Protection

Establish a curriculum development committee composed of subject leaders and industry experts, convening a course content update review meeting each semester. Develop the "Modular Course Update Standards" to clearly define the specific procedures and timeliness requirements for incorporating cutting-edge financial technology content into the curriculum.

5.3. Potential Challenges

Traditional financial educators lack technical skills such as Python and blockchain. Educators with technical backgrounds often lack theoretical depth, leading to a phenomenon where they "understand technology but not finance". Educational case studies lag behind technological development.

5.4. Future Prospects

Opportunities from Emerging Technologies: Metaverse and generative AI will enable new teaching innovations. Immersive financial decision environments and AI-assisted personalized learning should be incorporated to maintain cutting-edge curricula.

Deepening Interdisciplinary Integration: FinTech (Xie, 2022) development will further integrate finance with computer science, data science, and behavioral science. Future curricula must emphasize interdisciplinary perspectives for compound talent cultivation.

Expanding Global Perspectives: FinTech's globalization necessitates curricula with international comparisons and global outlooks. Incorporating international cases and transnational projects will develop students' global competitiveness.

Lifelong Learning Systems: Rapid FinTech evolution requires lifelong learning systems. Modular courses can extend to continuing education with micro-credentials and digital badges for flexible certification.

6. Conclusion

This study systematically explores the modular reform path of the "Monetary Finance" curriculum under FinTech development, constructing a three-dimensional "theory-technology-practice" teaching framework. Results indicate modular re-

form effectively addresses knowledge obsolescence and skill gaps in traditional systems, providing viable solutions for cultivating interdisciplinary talents suited for financial digital transformation.

The reform's core lies in integrating traditional financial theories with modern FinTech. Through coordinated design of basic theory, technology application, and practical innovation modules, students gain both financial literacy and technical skills. Innovative implementation paths—especially blended learning and dual-teacher models—provide strong support for reform execution.

Moving forward, "Monetary Finance" curricula must evolve dynamically with FinTech advancements, incorporating new technologies and concepts. Strengthening industry-academia collaboration, faculty development, and resource investment will ensure sustainable reform. This study offers theoretical and practical guidance for financial education reform, contributing significantly to innovative financial talent cultivation models.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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