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A Practical Case Study on Integrating Science-Technology Finance Literacy Education into Innovation Talent Training in Universities

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Abstract: This study examines a practical case in which science-technology finance literacy education is integrated into innovation talent training in a university setting, focusing on the implementation background, practice process, and evaluation outcomes. By establishing a curriculum system, teaching activities, school–enterprise collaboration, and ability-support mechanisms, the study observes students' performance in understanding science-technology finance concepts, using analytical tools, and applying knowledge in context. It also evaluates their practical capabilities and outcomes in innovation and entrepreneurship projects. The results show that students exhibit clear changes in knowledge application, project practice approaches, and outcome performance. Compared with traditional teaching models, the case-based model demonstrates a more pronounced advantage in promoting applied learning and enhancing project outcomes. Based on the evaluation results, the study summarizes scalable experience to provide reference for universities seeking to deepen science-technology finance literacy education within innovation talent cultivation.

1. Introduction

With the technology-driven upgrading of industrial structures and the rapid diffusion of financial tools, university talent training systems are facing newly emerging competency requirements. Interdisciplinary talents who possess technological insight, financial judgment, and resource integration abilities have become essential for advancing technological innovation and high-quality development. As an important approach to strengthening students' comprehensive cognition and practical capability, science-technology finance literacy education is gaining increasing prominence in university-level innovation talent training. However, many universities still face fragmented curricula, insufficient practice opportunities, and weak collaboration mechanisms, which makes it difficult to meet the evolving needs for talent. Therefore, exploring pathways for integrating science-technology finance education with innovation talent cultivation through practical cases holds meaningful value in improving talent training systems and enhancing students' future-oriented competencies.

2. Overview of the Case Background

2.1 Analysis of the Need for Science-Technology Finance Education in Universities

Scientific and technological innovation involves a series of processes such as technology evaluation, market assessment, financing method selection, and risk identification, all of which place comprehensive demands on students' literacy in science-technology finance. However, current university curricula often suffer from a separation between scientific and financial content, insufficient application scenarios, and limited opportunities for cross-disciplinary learning. As a result, students frequently face difficulties in understanding the linkages between science and finance or in making integrated judgments in real-world contexts. With universities increasingly emphasizing the cultivation of innovative talent, developing an educational model that enables students to build systematic cognitive and applied abilities in science-technology finance has become an important direction for teaching reform. This case was developed in response to these needs, addressing structural gaps in university-level science-technology finance education through practical engagement. Furthermore, the rise of the digital economy and new productive forces has strengthened the role of science-technology finance in innovation and industrial chains, making it essential for students to acquire integrated competencies such as data analysis, business insight, and project value assessment to meet future job requirements. Therefore, implementing systematic, contextualized, and sustainable science-technology finance education has become a crucial task for universities aiming to cultivate interdisciplinary talent.

2.2 Organizational Conditions and Foundations for Case Implementation

This case is implemented based on the interdisciplinary teaching and innovation-entrepreneurship education foundation of a university in East China. The university has established a teaching team composed of faculty from finance, management, information technology, and other disciplines, providing the professional capacity required for science-technology finance instruction and practical guidance. The institution also maintains long-term partnerships with regional technology enterprises, venture capital firms, and technology service organizations, offering students authentic environments for project practice, technical exchange, and investment-financing scenario experiences. In addition, the university has established a technology transfer center, an innovation-entrepreneurship incubation base, and comprehensive experimental platforms, all of which supply the necessary space, resources, and organizational support for delivering science-technology finance teaching content, ensuring the feasibility and continued advancement of the case. Meanwhile, the university has developed mature systems for curriculum management, credit recognition, and university-industry collaborative education projects, providing institutional guarantees for integrating the case into teaching plans and promoting it across various schools. Stable alumni entrepreneurship resources and supportive regional innovation policies further enhance the depth and extensibility of the case, laying a solid foundation for broader model-based dissemination.

3. Case Implementation Process

3.1 Construction of a Science-Technology Finance Literacy Curriculum System

The construction of a science-technology finance literacy curriculum aims to build a complete learning pathway that progresses from foundational understanding to applied practice, enabling students to gradually establish a structured knowledge framework. After clarifying the overall design principles, the process begins with developing curriculum modules covering technological cognition, financial fundamentals, and interdisciplinary content at the intersection of technology and finance, based on students' prior knowledge and training objectives. Next, the modules are arranged hierarchically, embedding content such as science-technology finance concepts, technology value assessment, financial tool utilization, and risk identification into the curriculum sequence[1]. Subsequently, articulation paths between modules are designed to ensure continuity between theoretical and practical courses. Finally, the curriculum system is integrated into the university's existing innovation-talent training framework, linking with project-based training, competition platforms, and practice activities to form a complete curriculum chain for science-technology finance literacy.

Furthermore, the curriculum system requires continuous improvement through a dynamic updating mechanism. For example, course emphases should be adjusted in response to changes in industry policies and emerging technological trends, and external experts should be involved in curriculum review to ensure alignment with the latest practices in the field. In addition, individualized advancement may be supported by establishing learning portfolios, allowing differentiated learning paths based on students' interests and competencies. This enables the curriculum system not only to maintain structural coherence but also to possess adaptability and forward-looking qualities.

3.2 Implementation of Project-Based and Contextualized Teaching Activities

Project-based and contextualized teaching activities are designed to help students understand science-technology finance concepts in real or simulated environments and to develop comprehensive judgment skills through task-driven processes. To achieve these teaching objectives, the design begins with developing several project tasks related to technology assessment, business model design, and financing decision-making based on course content. Students are then grouped to participate in simulated projects, with instructors providing essential information such as technology briefs, market context, and funding constraints to guide collaborative teamwork. Additionally, the projects include staged tasks—such as technical feasibility evaluation, business plan writing, and investment pitch simulations—requiring students to continuously apply classroom knowledge as the project progresses. Project activities are concluded through presentations, expert feedback, and post-project reflection sessions, enabling students to deepen their understanding of science-technology finance logic through reflective practice[2].

To enhance teaching effectiveness, the approach may incorporate the latest industry cases, real corporate decision-making contexts, and policy changes as dynamic variables, encouraging students to confront "open-ended problems" and develop judgment under uncertainty. Moreover, intelligent teaching platforms can be used to record students' teamwork behavior, task progression, and knowledge-point usage, enabling instructors to provide more precise pedagogical interventions and improving the authenticity and educational value of project-based and contextualized teaching.

3.3 Operational Model of the University-Enterprise Collaborative Practice Platform

The university-enterprise collaborative practice platform is intended to provide students with opportunities to directly engage with real industry needs and operational processes, thereby achieving deep alignment between education and industry through resource sharing. The platform's operational process includes the following steps: first, universities and technology enterprises or venture capital institutions determine collaboration directions and define areas such as technology consulting, project-based training, and investment-financing simulations. Next, enterprises supply actual project cases, industry data, and technology application scenarios as the foundational materials for student tasks[3]. Universities then organize student participation in practice activities guided by enterprise mentors, such as technology value analysis, industry trend assessment, and investment-financing plan design. Finally, jointly organized pitch simulations, results presentations, and feedback sessions provide students with professional evaluation and advice, helping establish a continuous improvement mechanism for platform operations.

Moreover, the platform must be supported by long-term, stable cooperation agreements to ensure a steady supply of project resources. Additional interactive components—such as enterprise open days, job shadowing experiences, and interviews with entrepreneurs—can help students develop a more multidimensional understanding of industry operations[4]. By incorporating student outputs into enterprise innovation task pools or technology demand databases, the platform can achieve two-way value creation, enhancing the sustainability and attractiveness of university-enterprise collaboration.

3.4 Support Mechanisms for Cultivating Students' Science-Technology Finance Competencies

To ensure continuous improvement in students' knowledge and practical abilities related to science-technology finance, a comprehensive support mechanism that encompasses learning, practice, and feedback must be established. The specific implementation pathways include the following: first, forming a mentoring team composed of interdisciplinary faculty members to provide academic support in technology, finance, and management throughout the learning process; second, developing a hybrid online–offline learning resource repository that offers case materials, industry reports, tool guides, and other supplementary resources; third, establishing phased competency assessment mechanisms—such as knowledge tests, project performance evaluations, and situational judgment assessments—to dynamically track changes in students' abilities; and finally, offering multiple feedback channels through faculty mentoring, peer assessment, and project outcome presentations, enabling students to strengthen their science-technology finance competencies through continuous practice and reflection.

In addition, learning behavior tracking and data analytics can be incorporated to identify students' weak points in knowledge comprehension and practical application, thereby enabling targeted instructional support. Universities may also establish dedicated scholarships in science-technology finance, innovation training funds, and other incentive measures to encourage students to engage continuously in practical activities and maintain high standards for personal development, ultimately fostering a positive learning and growth ecosystem[5].

4. Effectiveness Evaluation and Practical Insights

4.1 Evaluation of Students' Mastery and Application of Science-Technology Finance Knowledge

Students' performance in understanding science-technology finance concepts, operating analytical tools, and applying knowledge in contextualized scenarios demonstrates structured differences. A comparison between the outcomes of traditional teaching models and case-based teaching models reveals observable trends across multiple key indicators, clearly reflecting how differences in pedagogical models shape learning outcomes. The comparison results on students' mastery and application of science-technology finance knowledge are presented in Table 1.

Table 1 Comparison of Students' Mastery and Application of Sci-Tech Finance Knowledge (Unit: %)

Indicator Category	Traditional Teaching Mode	Case-based Teaching Mode
Knowledge Understanding	62%	86%
Proficiency in Using Financial Tools	58%	82%
Accuracy of Scenario Application	54%	79%

Table 1 shows that the case-based teaching model performs significantly better than the traditional teaching model across three indicators—knowledge comprehension, proficiency in using financial tools, and accuracy in contextual application—with differences of 24, 24, and 25 percentage points, respectively. The analysis is as follows: first, the improvement in knowledge comprehension mainly stems from modularized course design and interdisciplinary instruction, which allow key concepts to reappear across multiple scenarios and be applied promptly, thereby strengthening students' grasp of the overall knowledge structure. Second, the disparity in financial tool proficiency reflects the higher frequency and greater authenticity of practice opportunities in the case-based model—through repeated simulations, hands-on tool operation, and feedback loops, students reinforce procedural memory and master operational workflows. Third, the increase in contextual application accuracy indicates that the scenario design and problem authenticity in case-based teaching are more closely aligned with real industry conditions, facilitating the transfer of knowledge to situational judgment. It should be noted that although the quantitative differences reveal a clear trend, they do not necessarily imply universal applicability across all contexts; future studies may incorporate matched control groups and longitudinal tracking to test robustness.

4.2 Evaluation of Students' Practical Abilities and Output in Innovation and Entrepreneurship Projects

During the implementation of innovation and entrepreneurship projects, students demonstrate differentiated development in areas such as solution design, business logic construction, outcome generation, and project presentation. By comparing the results of the traditional teaching model with those of the case-based model, further insights can be drawn regarding how the case-based approach influences the formation of students' practical project abilities. The comparison of practical abilities and outputs in innovation and entrepreneurship projects is presented in Table 2.

Table 2 Comparison of Innovation and Entrepreneurship Project Practice Ability and Output (Unit: %)

Indicator Category	Traditional Teaching Mode	Case-based Teaching Mode
Project Proposal Completion	67%	90%
Performance in Business Logic and Financial Feasibility	59%	84%
Quality of Project Outcomes (including prototype/model level)	55%	83%
Review Pass Rate or Shortlisting Rate	18%	46%

Table 2 shows that the case-based teaching model outperforms the traditional model across multiple dimensions, including project plan completion, business logic and financial feasibility, output quality, and approval rate by evaluators—each by several significant percentage points. A deeper analysis reveals the following: First, the substantial difference in project plan completion is attributable to the milestone-based structure and involvement of external mentors in the case-based model, which help students manage time and divide tasks more systematically. Second, the higher scores in business logic and financial feasibility reflect students' improved ability to establish connections among technology, markets, and capital—a result closely linked to the availability of real market data and the participation of enterprise evaluators. Third, the enhancement in output quality and approval rates demonstrates the effectiveness of iterative feedback mechanisms: multiple rounds of expert critique, internal team revisions, and enterprise-oriented requirements collectively improve the completeness and market fit of student projects. On the other hand, the data also suggests that scaling up the model requires attention to the decisive influence of resource inputs—such as enterprise mentors and practice platforms—on output quality, as well as the heterogeneous performance of students from different disciplinary backgrounds. It is therefore recommended that differentiated support and tiered mentoring strategies be considered during broader implementation.

4.3 Transferable Experience and Optimization Suggestions

Based on the case practice, the promotion of the model should adhere to the principles of balancing coursework and practical training, as well as coordinating internal and external resources. This includes developing modular curricula that allow students from different majors to select courses according to their needs, establishing long-term and stable university–industry cooperation mechanisms to ensure the supply of authentic project resources, and creating a diversified evaluation system (knowledge assessment + project performance + enterprise feedback) to support continuous improvement. To enhance replicability, it is recommended to develop standardized teaching packages (syllabi, case banks, assessment rubrics) and conduct joint training for teachers and industry mentors, while strengthening the scheduling and incentivization of practical components. At the same time, attention should be paid to regional industrial characteristics and institutional differences, adopting tiered promotion strategies and establishing regular monitoring and feedback channels to ensure the model's adaptability and long-term sustainability in varied environments.

In the further implementation of case-based promotion, emphasis should also be placed on improving cross-platform resource integration and sharing mechanisms, such as developing inter-university case repositories, industry data platforms, and online mentoring systems to expand access to teaching resources and practical scenarios. Meanwhile, introducing digital and intelligent tools for learning analytics, project process documentation, and competency-development tracking can enhance the efficiency of teaching management and provide students with visualized growth pathways. In addition, building stable collaborative networks between local universities and industry organizations can further strengthen external support for dissemination, enabling science-and-technology financial literacy education to achieve a virtuous cycle of wider application and continuous optimization.

5. Conclusion

This study centers on integrating science-technology finance literacy education into the cultivation of innovative talent in higher education. Through curriculum development, case-based teaching, university–enterprise collaboration, and project-based practice, a relatively practical and operable training pathway has been established. Based on the combined analysis of case data and practice feedback, the main achievements are as follows:

1）Significant improvement in students' science-technology finance competencies, including knowledge comprehension, tool utilization skills, and contextual application accuracy, demonstrating enhanced cognitive integration and analytical capability;

2）Notable enhancement in the quality of innovation and entrepreneurship project practice, with increases in project maturity, coherence of business logic, and financial feasibility, leading to higher recognition of student outputs by evaluators;

3）Progressive improvement of university–enterprise collaboration mechanisms, achieving deep integration among real project resources, industry mentor guidance, and the academic system, thereby providing a more stable support environment for student practice.

Despite these accomplishments, the study still has certain limitations. For example, the research sample is drawn primarily from a single institution, limiting the representativeness of the data, and the availability of university–enterprise collaboration resources varies across different regions and institutions. Moreover, the long-term effects of science-technology finance literacy education require more systematic longitudinal tracking. Future work may involve multi-institution collaborative research on a larger scale, the development of transferable teaching models suitable for different disciplines, and the exploration of intelligent technologies for learning analytics, industry data acquisition, and practice simulation, in order to further enhance the scientific rigor and sustainability of innovation talent cultivation in higher education.

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