

# Mechanism Study on Scenario Innovation Empowering the Integration of Specialty and Innovation Education Reform: A New Liberal Arts Course Practice Based on the “Teacher-Student-Machine” Collaboration

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**Abstract:** Against the backdrop of the accelerated application of artificial intelligence, courses integrating specialty education and innovation-entrepreneurship education still face challenges such as the disconnection between learning and application, imbalance in collaboration, and insufficient educational effectiveness. Taking the course E-commerce Innovation and Entrepreneurship as an example, this study introduces the perspective of scenario innovation and constructs a teaching mechanism centered on real value-creation scenarios and supported by “teacher-student-machine” collaboration. The paper elaborates on its operational mechanism from three dimensions: content reconstruction, collaborative operation, and immersive education. A closed-loop educational model characterized by “structural optimization, process collaboration, and value accumulation” is thus formed. This study expands the explanatory framework of scenario innovation and human-machine collaboration in innovation and entrepreneurship education, and provides references for the integration of specialty and innovation education and AI-empowered teaching reform in the New Liberal Arts context.

**Keywords:** Scenario innovation; Integration of specialty and innovation education; Artificial intelligence; E-commerce Innovation and Entrepreneurship

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## 1. Introduction

The *Outline of the Plan for Building a Strong Country in Education (2024–2035)* clearly states that digital and intelligent should be used to promote the connotative development of higher education, strengthen students’ innovative spirit, practical ability, and sense of social responsibility, and accelerate the cultivation of high-

quality innovative talents who adapt to the development of new technologies, new industries, and new business forms. Since 2015, China has systematically promoted the reform of innovation and entrepreneurship education. Universities have made remarkable progress in curriculum development, practical platform construction, and competition system improvement. Teaching practice reveals insufficient integration between innovation and entrepreneurship education and specialty education. This is exemplified by the issues of “projects without scenarios, activities without mechanisms, and outcomes without transformation” in specialty and innovation integrated courses <sup>[1]</sup>.

With the wide application of artificial intelligence in higher education, AI-empowered teaching is expected to significantly improve teaching quality and learning efficiency <sup>[2,3]</sup>. However, in courses integrating specialty and innovation-entrepreneurship education, the application of AI is mostly instrumental and fragmented, remaining at superficial levels such as data retrieval, text generation, or homework assistance, and has not fundamentally reshaped teaching organization and learning logic <sup>[4]</sup>. Meanwhile, industry-education integration projects are often introduced into the classroom as “externally embedded resources.” There is a lack of systematic connection between project tasks and curriculum objectives, making it difficult for students to develop innovative abilities through continuous practice.

Thus, the superposition of single elements is insufficient to solve the practical dilemma of weak ability cultivation in specialty-innovation integration courses. The teaching reform of such integrated courses urgently requires a systematic perspective that can integrate multiple elements and restructure the operational logic of teaching <sup>[5]</sup>. Accordingly, this paper introduces “scenario innovation” as an analytical framework and conducts an overall design of teaching contexts, action rules, and interactive relationships around real-world problems and value creation goals. By constructing teaching scenarios characterized by “teacher-student-machine” collaboration, scenario innovation not only entails the actualization of teaching contexts but also emphasizes the reconstruction of collaborative relationships among teachers, students, and AI technology. Based on the New Liberal Arts teaching reform practice of “AI + industry-education integration,” this paper systematically analyzes the implementation mechanisms and evolutionary paths of the teaching reform in the course E-commerce Innovation and Entrepreneurship from the perspective of scenario innovation. It focuses on addressing the following questions: How to construct specialty-innovation integrated teaching scenarios supported by AI and industry-education integration? Through what mechanisms does scenario innovation influence students’ innovation and entrepreneurship capabilities? What implications does this mechanism hold for universities in advancing the reform of specialty-innovation integrated courses?

## **2. Theoretical basis and analytical framework**

### **2.1. The theoretical connotation of scenario innovation and its implications for teaching**

Scenario innovation is defined as the reconstruction of participants, action rules, resource allocation, and technical support around specific value goals, so as to activate the sustainable process of value creation. The introduction of scenario innovation into education lies in the re-understanding of the mechanism of learning. Different from traditional teaching models, scenario innovation emphasizes embedding learning activities in real contexts. Learners complete cognitive construction and capability generation through continuous participation, repeated trial and error, and multi-agent interaction. This perspective provides a new theoretical tool for explaining students’ innovation and entrepreneurship capability formation <sup>[6,7]</sup>.

## 2.2. “Teacher-student-machine” collaboration

With the wide application of artificial intelligence technology in education, “AI + education” is reshaping traditional teaching forms<sup>[8-10]</sup>. Different from the early view that regards technology as a teaching aid, human-machine collaboration theory emphasizes the active participation of technology in cognitive support, decision-making suggestions, and action feedback, holding that the learning process is the result of the joint effect of human subjects and intelligent systems. Teachers, students, and machines are regarded as interdependent and dynamically evolving actors. The collaborative relationship among the three determines the operational efficiency of teaching activities and the effectiveness of education.

## 2.3. The overall analytical framework

Systematic integration of artificial intelligence technology and industry-education integration resources helps restructure the inherent relationships among teaching objectives, teaching processes, and learning outcomes, forming a mechanism that promotes the development of students’ innovation and entrepreneurship capabilities. The overall analytical framework is shown in **Figure 1**. Scenario construction layer: by introducing real-world industry and societal challenges, clearly defining value creation objectives, and constructing authentic and sustainable teaching scenarios. Collaborative operation layer: “teacher-student-machine” collaboration serves as the core logic. Task-driven dynamic coordination among teacher guidance, student practice, and AI support drives learning activities to iterate through continuous feedback and adjustment. Capability generation layer: Multiple rounds of practice and reflection gradually transform students’ on-scene behaviors into innovation and entrepreneurship capabilities. Scenario innovation stimulates students’ innovative motivation through situational immersion, improves learning and decision-making efficiency through human-machine collaboration, and strengthens capability internalization and outcome transformation through value orientation.

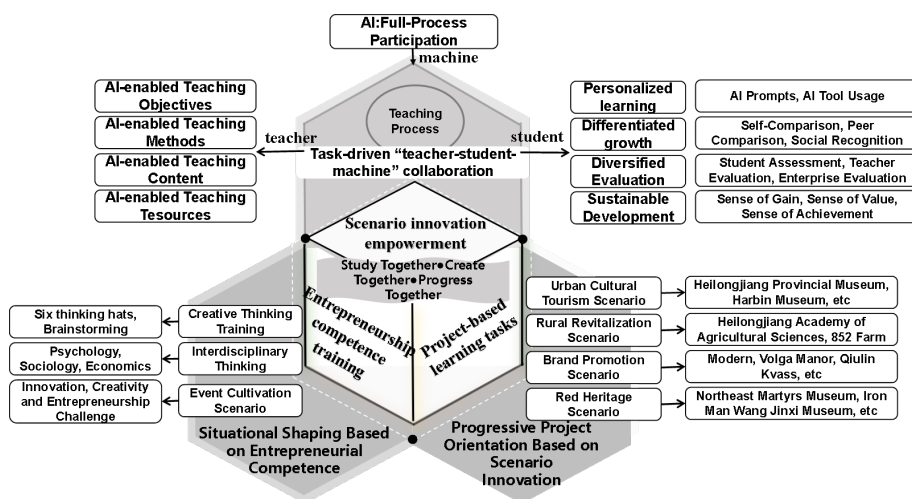


Figure 1. The overall analytical framework

## 3. Mechanism innovation of specialty-innovation integration teaching reform for e-commerce major: Taking E-commerce Innovation and Entrepreneurship as an example

### 3.1. Mechanism innovation I: Reshaping the teaching content system of specialty-innovation integration with scenario empowerment

Taking scenario innovation as the focus and real value creation scenarios as the core, the course integrates

professional knowledge, including market analysis, product planning, content operation, and data analysis, with innovative thinking training and entrepreneurial practice into a unified learning scenario. Scenario empowerment helps build teaching contexts connected to the real world, and originally scattered teaching content is reorganized into a knowledge and action system centered on problem-solving. Based on the “practice-reflection-repractice” cycle, multiple rounds of action and feedback guide students to transform knowledge into transferable innovation and entrepreneurship capabilities; the course stimulates problem awareness through case introduction, promotes interdisciplinary collaboration via cooperative exploration, deepens understanding of innovative solutions through debate, and revises cognition through creative practice and evaluation, finally achieving the internal integration of knowledge and ability. In this process, the course upgrades artificial intelligence from a single tool to a full-process collaborative participant. For example, in the interesting task stage, AI focuses on idea generation and brainstorming; in the professional research stage, AI participates in scheme trial and error and market simulation; in the innovative research stage, AI supports data monitoring and business model optimization.

### **3.2. Mechanism innovation II: Situational teaching mechanism based on real value creation**

Guided by real value creation, the course systematically reconstructs teaching scenarios in line with the industrial attributes of e-commerce and the requirements of emerging liberal arts education. Departing from traditional instruction centered on virtual cases or simulated tasks, the course incorporates scenario modules including urban culture and tourism, rural revitalization, brand promotion, revolutionary heritage inheritance, and competition drills, with project tasks designed under real-world constraints and market feedback. Each scenario corresponds to clear value objectives and evaluation criteria; students complete market research, scheme design, and communication practices based on authentic needs. Such a scenario-based teaching mechanism effectively enhances the authenticity of learning environments; students’ innovative behaviors extend beyond assignment completion to address real-world problems directly. Instructors guide students to reflect on decisions through periodic diagnosis and feedback; AI is deeply involved in scheme trial and error, data analysis, and scenario simulation. Students continuously adjust their cognition and action strategies through multiple rounds of collaborative practice. Scenario-based teaching eliminates inefficient practice and shifts curriculum reform toward high-quality “teacher-student-machine” collaboration. It promotes the development of innovation and entrepreneurship capabilities in real value creation, resolving the imbalance in “teacher-student-machine” coordination.

### **3.3. Mechanism innovation III: Promoting competence internalization and value-oriented education through immersive scenarios**

To address the functional weakness of inadequate education in specialty-innovation integration courses, the course establishes an immersive education mechanism guided by immersive experience and scenario-based cultivation. Ideological and political elements are integrated into scenarios involving industry regulations, rural revitalization, and cultural inheritance. Students are guided to step outside the classroom into society, engage directly with enterprises, and understand industrial norms, enhance social responsibility, and develop patriotism in authentic contexts. Immersive scenarios integrate value guidance naturally into innovation and entrepreneurship practice through hands-on participation and situational experience. Supported by the E-Commerce Innovation and Entrepreneurship Center, the course builds a practical platform featuring

distinctive bases, policy guidance, and project-driven operation. Activities, including team-building exercises, social surveys, and project presentations, strengthen students' understanding of the mission and responsibility of young e-commerce professionals in the new era; a study group for ideological and political practice is organized to encourage students to apply professional skills to solve real-world problems under themes such as "Contribute Ideas for My Hometown, University, and Major." In immersive educational scenarios, students gradually shift from passive acceptance to active identification, promoting the coordinated internalization of innovation and entrepreneurship capabilities, value recognition, and social responsibility.

### **3.4. Implications for the reform of specialty-innovation integration courses**

The key to teaching reform lies in achieving the alignment of professional learning, innovative practice, and ideological-political education through scenario design. This mechanism not only provides a replicable practical path for the reform of specialty-innovation integration courses under the background of new liberal arts, but also offers effective reference for universities to promote the deep coordination of innovation and entrepreneurship education and the moral education goal under AI-enabled conditions.

## **4. Conclusion**

Against the background of emerging liberal arts construction and AI-enabled higher education, the reform of specialty-innovation integration courses has shifted from whether to offer innovation and entrepreneurship education to how to achieve high-quality and sustainable integrated education. The reform of the E-Commerce Innovation and Entrepreneurship course demonstrates that scenario innovation and "teacher-student-machine" collaboration play a key role in solving teaching dilemmas in specialty-innovation integration. With scenario design centered on real value creation enables teaching content to shift from knowledge splicing to situational integration, promoting the transfer and application of professional knowledge in solving real-world problems; with AI introduced as a full-process collaborative participant, teaching operation shifts from inefficient practice to high-quality collaborative practice; with immersive educational scenarios, innovation and entrepreneurship education and value guidance develop in the same direction. Specialty-innovation integration is no longer a simple superposition of professional courses and innovation and entrepreneurship courses, but a systematic education process linked by scenario innovation and supported by collaborative mechanisms.

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## **Disclosure statement**

The authors declare no conflict of interest.

## Author contributions

Qinying Sun: Writing – original draft, Writing – review & editing, Resources, Funding acquisition, Conceptualization

Yuxin Cui: Translation and Layout editing

Yuanyuan Chen: Paper modification and final version revision

## References

- [1] Liu Y, Bian S, 2019, Problems' Causes and Countermeasure Analysis of Innovation and Entrepreneurship Education in Colleges and Universities. *Modern Education Management*, (09): 32–37.
- [2] Bian S, Fan Y, 2025, Theoretical Logic, Implementation Mechanisms and Action Pathways of Digital Empowerment in University Teaching Transformation. *Modern Education Management*, (12): 76–85.
- [3] Su R, 2025, Logic, Path and Reflection of Interdisciplinary Project-Based Learning Enabled by Generative AI. *Theory and Practice of Education*, 45(32): 3–7.
- [4] Wang S, Huang Y, 2025, Research on the Formation Mechanisms and Prevention Strategies of Improper Use of Generative Artificial Intelligence. *China Higher Education Research*, (11): 24–31.
- [5] Xie Y, Chen W, 2025, Research on the Reconstruction of Classroom Teaching in Universities Empowered by Artificial Intelligence. *e-Education Research*, 46(10): 5–13.
- [6] Dang T, Wang H, 2025, Research on the Dimension and Path of Scene-based Construction of Emotional Community Between Teachers and Students in the Era of Human Machine Symbiosis. *China Educational Technology*, (09): 63–69 + 78.
- [7] Wu T, 2025, A Study on the New Smart Scenarios of “Three-Involving Education” for Forging a Strong Sense of Community for the Chinese Nation in Universities. *Journal of Ethnology*, 16(06): 28–35 + 149.
- [8] Bell R, Bell H, 2023, Entrepreneurship Education in the Era of Generative Artificial Intelligence. *Entrepreneurship Education*, 6(3): 229–244.
- [9] Zhang L, 2025, Integrating AI with Innovation and Entrepreneurship Education in Universities. *Discover Artificial Intelligence*, 5(1): 1–15.
- [10] Park JH, Kim SJ, Lee ST, 2025, AI and Creativity in Entrepreneurship Education: A Systematic Review of LLM Applications. *AI*, 6(5): 100.

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