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Research on Teaching Reform for "Fundamentals of Innovation and Entrepreneurship" Based on the OBE-BOPPPS Dual-Integration Model in the Context of Artificial Intelligence

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Abstract: As the new wave of technological revolution and industrial transformation deepens, technologies such as artificial intelligence, big data, and generative AI are profoundly reshaping social production methods and knowledge structures. Consequently, the talent cultivation objectives and teaching models of higher education are transforming. Against this backdrop, innovation and entrepreneurship education has been imbued with new contemporary significance. Its function has gradually shifted from merely providing employment guidance or entrepreneurial skills training to serving as a vital pillar for advancing the national innovation-driven development strategy, cultivating new productive forces, and nurturing interdisciplinary innovative talents. However, as a university-wide required general education course, "Fundamentals of Innovation and Entrepreneurship" still faces challenges in teaching practice. These include an overemphasis on knowledge transmission in teaching objectives, a lecture-dominated classroom organization, insufficient student engagement and practical experience, and an evaluation approach biased toward summative assessment. These issues make it difficult for the course to meet the real-world demands of the intelligent era for the competency structure of innovation and entrepreneurship talent. Outcome-Based Education (OBE) emphasizes learning outcomes as the guiding principle. By reverse-engineering teaching objectives, content, activities, and assessment methods to ensure consistency among instructional elements, OBE provides crucial theoretical support for shifting innovation and entrepreneurship courses from "what is taught" to "what students ultimately achieve." The BOPPPS instructional model constructs a closed-loop classroom teaching process through six stages: introduction, objectives, pre-assessment, participatory learning, post-assessment, and summary. This effectively enhances classroom structure and student engagement, particularly suited for competency- and process-oriented courses. In the context of AI, integrating OBE principles with the BOPPPS classroom model not only clarifies competency-oriented objectives for innovation and entrepreneurship courses but also leverages intelligent technologies to support information retrieval, idea generation, solution iteration, and learning analytics. This enhances the operability and sustainability of teaching implementation and assessment. Based on this, this paper takes the "Fundamentals of Innovation and Entrepreneurship" course as its research subject, exploring teaching reform pathways under the dual-integration model of OBE-BOPPPS in the AI context. It aims to drive the course's transformation from knowledge-oriented to competency-oriented and from outcome-based to process-based evaluation by reconstructing course objectives, optimizing classroom structure, and refining formative assessment mechanisms. This provides a replicable and scalable practical paradigm for teaching reform in university innovation and entrepreneurship courses.

Keywords: OBE concept; BOPPPS model; Teaching model

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1. Introduction

The rapid advancement of AI technology in China is propelling innovation and entrepreneurship education from "digital support" toward "intelligent reconstruction." The widespread application of new tools such as AIGC and intelligent agents is continuously transforming methods for idea generation, market insight, solution iteration, and outcome presentation. While these developments provide new teaching tools and practical scenarios for university innovation and entrepreneurship education, they also impose higher competency development requirements on the "Fundamentals of Innovation and Entrepreneurship" course. Against this backdrop, the course objectives must closely align with the AI-driven transformation of innovation and entrepreneurship education. Systematic optimization should be achieved across key dimensions, curriculum content, methodologies, assessment, interaction, and management, to emphasize the synergistic enhancement of students' innovative thinking, practical skills, and technological application capabilities.

2. Educational objectives of the "fundamentals of innovation and entrepreneurship" course

Centered on helping students develop integrated core competencies in "innovative thinking–entrepreneurial awareness–practical skills," the course prioritizes cultivating their comprehensive ability to solve complex problems using intelligent tools within real or simulated entrepreneurial contexts. Through course content restructuring and teaching method optimization, the course guides students to understand key challenges facing innovation and entrepreneurship education in the intelligent era (such as lack of practical scenarios, lagging competency development, and limited interaction). Simultaneously, it integrates capabilities of AI large models, including data-driven analysis, intelligent assessment, and precise intervention, into classroom tasks and project workflows. This enables students to develop competencies across the entire chain of "problem identification–user insight–solution generation–iterative optimization–pitch presentation." Simultaneously, the course should strengthen the development of an outcome-oriented goal system, shifting teaching from "knowledge delivery" to "facilitating competency attainment," and providing a clear foundation for subsequent OBE-based course goal decomposition and achievement evaluation.

Furthermore, the course should prioritize cultivating students' awareness of human-machine collaboration, teamwork capabilities, and professional ethics. It should guide students to develop sound perspectives on technology and entrepreneurship within the collaborative structure of "instructor-student-AI tools," preventing innovation and entrepreneurship learning from becoming overly tool-driven or fragmented. This facilitates a learning transition from "static provision" to "dynamic generation" [1]. At the job-alignment level, the course should equip students to meet professional demands in innovation and entrepreneurship project incubation, corporate innovation management, digital content operations, and cultural-creative product planning. It should enhance their comprehensive abilities to identify opportunities, validate solutions, and integrate resources within uncertain environments. Ultimately, this provides curricular support for cultivating innovation and entrepreneurship talent in the intelligent era and advancing high-quality dual-innovation education in higher education institutions.

3. Primary issues in "fundamentals of innovation and entrepreneurship" classroom instruction

3.1. Classroom organization leans toward lecture-based delivery with insufficient student engagement

In current teaching practices for "Fundamentals of Innovation and Entrepreneurship," classroom organization primarily relies on teacher lectures and case presentations. Students often remain passive recipients of knowledge, with limited opportunities for classroom discussions, practical investigations, and scenario-based decision-making. While this lecture-centered approach facilitates rapid content delivery, it struggles to effectively stimulate students' learning initiative and innovative thinking.

In terms of learning outcomes, students' lack of sustained engagement and contextual experience in class often limits them to grasping conceptual knowledge about innovation and entrepreneurship. They struggle to analyze problems, generate solutions, and make decisions in real or simulated scenarios, resulting in a significant disconnect between classroom learning and skill development.

Particularly against the backdrop of rapid AI advancement, innovation and entrepreneurship increasingly rely on data analysis, intelligent tools, and cross-disciplinary collaboration. If classrooms remain confined to "explaining processes clearly and understanding case studies," students will struggle to develop practical skills for complex scenarios. Therefore, how to enhance student engagement through classroom structure optimization has become the foremost issue requiring urgent attention in the reform of the "Fundamentals of Innovation and Entrepreneurship" course.

3.2. Insufficient teacher competence in intelligent teaching limits curriculum reform implementation

The "Fundamentals of Innovation and Entrepreneurship" course in the AI era demands that instructors not only possess theoretical expertise in innovation and entrepreneurship education but also integrate intelligent tools, data resources, and classroom tasks organically. This shift aims to transition teaching methods from experience-driven to data-supported approaches. However, practical teaching observations reveal that some instructors still exhibit significant shortcomings in applying intelligent tools pedagogically and utilizing formative learning data. Consequently, curriculum reform often remains confined to conceptual discussions, struggling to establish stable implementation mechanisms within classrooms.

Simultaneously, innovation and entrepreneurship courses are inherently interdisciplinary and open-ended. Without a systematic understanding of how AI-supported learning transforms pedagogical approaches, teachers may revert to traditional classroom designs. Practical components also struggle to establish continuous competency development pathways, undermining the overall effectiveness of curriculum reform.

At a deeper level, insufficient teacher competency in intelligent teaching creates a structural tension. While curriculum goals emphasize "capability development," classroom implementation remains dominated by "knowledge delivery." Therefore, strengthening teachers' capabilities in intelligent instructional design and classroom organization is a critical prerequisite for effectively implementing curriculum reform.

3.3. Insufficient practical resources and teaching context support lead to fragmented learning experiences

Innovation and entrepreneurship education heavily relies on practical contexts and project-based carriers. However, during the implementation of the "Fundamentals of Innovation and Entrepreneurship" course in some universities, issues such as insufficient practical resource supply, lagging platform development, and inadequate coordination between on-campus and off-campus resources persist. This makes it difficult for students to gain continuous and comprehensive practical experiences within the classroom.

In the AI era, while AIGC tools, digital platforms, and simulation systems offer new possibilities for innovation and entrepreneurship practice, without systematic instructional organization and resource support, these tools are often used in isolation. They struggle to integrate into comprehensive teaching processes, thereby diminishing their educational value [2].

Insufficient practical scenarios also amplify the fragmentation of classroom learning. While students can complete individual tasks or phased assignments, they lack a systematic understanding of the entire innovation and entrepreneurship process, making it difficult to achieve stable skill transfer. Therefore, how to construct a practical environment and resource system aligned with course objectives is a critical issue that cannot be avoided in the current curriculum reform.

3.4. Evaluation methods overemphasize outcomes, failing to reflect competency development processes

Regarding evaluation mechanisms, some "Fundamentals of Innovation and Entrepreneurship" courses still rely primarily on summative assessments, paying insufficient attention to students' innovation processes, practical engagement, and

collaborative performance. Such evaluations struggle to authentically reflect the dynamic progression of students' competency development. This outcome-oriented approach not only limits students' capacity for continuous improvement but also fails to provide effective grounds for instructional adjustments.

From an outcomes-based perspective, evaluation of innovation and entrepreneurship courses should align closely with course objectives and competency outcomes, particularly by strengthening documentation and analysis of the learning process. Existing research indicates that enhancing teaching portfolios, formative assessment, and multi-stakeholder evaluation mechanisms can improve the scientific rigor and guidance of course evaluation [3].

The current mismatch between evaluation methods and course objectives hinders the formation of a closed-loop mechanism linking "objectives–process–evaluation–improvement" in classroom teaching, thereby weakening the sustained momentum for instructional reform. Therefore, reconstructing an evaluation system aligned with OBE principles is a crucial step in deepening the reform of the "Fundamentals of Innovation and Entrepreneurship" course.

4. The OBE-BOPPS Dual-integration model for teaching reform in the "fundamentals of innovation and entrepreneurship" course

4.1. Reconstructing course instructional design based on OBE principles

Advancing the reform of the "Fundamentals of Innovation and Entrepreneurship" course in the context of AI requires starting from the learning outcomes students ultimately achieve. This approach involves working backward to establish the course objective system, organize teaching content, arrange classroom activities, and determine methods for collecting assessment evidence. This ensures consistency between "objectives-process-assessment" and enables sustainable improvement. The core of outcomes-based education lies in transforming "concept memorization" into "task completion." Therefore, the course must precisely define learning outcomes around the structure of innovation and entrepreneurship competencies, such as: opportunity identification and problem definition, user insight and value proposition articulation, business model construction and validation, team collaboration and resource integration, pitch presentation and iterative optimization. These should be broken down into observable, assessable phased competency indicators.

In restructuring course content, it should align with the transformative demands of innovation and entrepreneurship education in the intelligent era by embedding "AI tool application literacy" throughout the innovation-entrepreneurship process. For instance, introducing AIGC for divergent thinking and prototype expression during idea generation; incorporating data retrieval and intelligent analysis during research and validation; and applying smart assessment and precision intervention during solution iteration. This enables students to form a learning chain of "tool usage → method comprehension → skill transfer" while completing project tasks.

Regarding teaching methods, project-task-driven approaches should replace fragmented lectures. Through "problem-oriented, inquiry-based, iterative" organization, classroom learning should be embedded in real or simulated entrepreneurial scenarios, enabling students to develop higher-order competencies through continuous trial-and-error refinement. Research indicates that AI large models can enhance the effectiveness of "Entrepreneurship Fundamentals" courses through data-driven analysis, intelligent assessment, and precise intervention, fostering the coordinated development of innovative thinking and entrepreneurial practice capabilities [4].

Simultaneously, the outcome-oriented nature of OBE demands high alignment between assessment criteria and course objectives. Each learning outcome must be supported by corresponding evaluation evidence, such as project portfolios, pitch videos, user interview records, iteration logs, and peer evaluations, and generate traceable achievement analyses to inform continuous course improvement.

4.2. Activating learning engagement and skill development through the BOPPS structured classroom process

Given the highly practical nature of the "Fundamentals of Innovation and Entrepreneurship" course, where engagement

directly determines outcomes, the six-step BOPPPS framework can be integrated into every class session to achieve structured instruction and a closed-loop learning process. Existing teaching reform studies indicate that combining OBE with BOPPPS concretizes learning objectives, enhances classroom interaction, and improves student engagement and learning effectiveness.

4.2.1. Pre-class phase: Introduction (B)–Objectives (O)–Pre-test (P)

The pre-class phase focuses on "immersing students in context, making objectives visible, and measuring starting points." The introduction may employ "AI-era entrepreneurial hotspots + campus/local industry cases," such as sharing short videos or case studies like "Business Model Innovations Triggered by AI-Generated Content" or "AIGC-Assisted Brand Communication" to help students recognize how technological shifts impact entrepreneurial opportunities.

The Objectives phase should anchor to OBE outcomes, articulating the competencies to be achieved in operational terms, e.g., "Develop a preliminary user persona using AI tools and formulate testable hypotheses." The Pre-test phase can assess students' grasp of foundational concepts like "opportunity-pain point-value proposition" through online quizzes, concept matching, or self-assessment questionnaires, providing a basis for differentiated instruction.

4.2.2. In-class phase: Participatory learning (P)–Post-test (P)–Summary (S)

The core of the in-class phase is transforming "understanding" into "execution." Participatory learning can adopt a "team co-creation + human-machine collaboration" task structure: Students work in groups to complete "problem definition → user insights → solution generation → rapid iteration." At key junctures, students must demonstrate how AI-generated content is screened, rewritten, and validated, preventing AI from being treated as a "writing tool" and ensuring methodological training [5].

Post-assessment may employ "task submission," such as requiring each group to produce "a one-page business model canvas + validation plan." Immediate teacher feedback and peer reviews then evaluate whether they meet the lesson's competency goals. The summary phase distills common issues from post-assessment performance (e.g., incomplete validation logic, user insights based on assumptions) and provides next-step iteration directions, creating a closed-loop classroom experience.

4.2.3. Post-class phase: Consolidation–Expansion–Transfer

Post-class emphasizes "transferring classroom tasks to more complex scenarios." Assign iterative tasks that build upon classroom projects, such as conducting a round of real user interviews, updating user personas, using AIGC to generate and optimize pitch presentation materials, and facilitating reflection sharing and peer support in discussion forums to establish a continuous feedback mechanism.

4.3. Building an integrated practical teaching support system: "Project-Platform-Competition"

To enhance the practical teaching quality of the "Innovation and Entrepreneurship Fundamentals" course, a practice support system aligned with course objectives must be established. This enables students to undergo continuous training from "idea generation" to "validation and iteration" to "outcome presentation" within the course. Research indicates that innovation and entrepreneurship education reform in the intelligent era requires coordinated efforts across dimensions including curriculum systems, project practices, educational tools, and interdisciplinary collaboration as outlined:

(1) Project-driven approach: Establish a "project repository" centered on themes relevant to students' majors and daily lives, such as cultural creativity, digital content, and campus services. Each project should include a "problem scenario–target deliverables–validation pathway–iteration milestones" framework to ensure cohesive practical training. AIGC-enabled research also suggests focusing on the systematic integration of course content, resource allocation, and industry-academia collaboration to enhance hands-on innovation skills;

(2) Platform support: Develop or integrate on-campus innovation and entrepreneurship incubation spaces, virtual

simulation, or online collaboration platforms to facilitate research, collaboration, reflection, and presentation. Simultaneously establish a "process data" collection mechanism, preserving student iteration logs, review records, and pitch videos as learning evidence to provide a data foundation for OBE evaluation [6];

(3) Competition-driven: Align course tasks with training elements for university- and provincial-level innovation and entrepreneurship competitions to create a closed-loop system where "competitions drive learning and teaching." Project outcomes completed in courses can be directly used for competitions or campus exhibitions, while competition feedback informs classroom objectives and task design, linking course practice with outcome transformation.

4.4. Establishing a multi-dimensional evaluation system aligned with outcomes-based education

To more effectively assess students' knowledge mastery, practical skills, and innovative performance in the "Fundamentals of Innovation and Entrepreneurship" course, a comprehensive, multi-dimensional evaluation system aligned with OBE outcomes can be developed and integrated into the BOPPPS classroom loop. Research indicates that AIGC application practices can be incorporated into course evaluation models, enhancing teaching quality and student innovation capabilities through task- and project-driven approaches.

4.4.1. Pre-class evaluation: diagnostic assessment and learning preparation

Pre-class diagnostic measures, such as online self-assessments, task-oriented readiness checklists, micro-surveys, and "opportunity radar" observation logs, can be systematically employed to identify students' prior knowledge, conceptual gaps, and interest domains. These instruments are intended not as evaluative grading mechanisms, but as formative tools that establish baseline competencies and map differentiated entry points for learning. By clarifying students' starting positions and relative readiness levels, instructors can design tiered instructional pathways and calibrate task complexity to support meaningful engagement in subsequent participatory classroom activities [7].

4.4.2. In-class assessment: process evidence and competency demonstration

In-class assessment emphasizes process-oriented and evidence-based evaluation, including quality of task completion, group collaboration performance, number of solution iterations with rationale, and performance in impromptu presentations and defenses. Online real-time feedback tools can facilitate immediate course correction. From a human-machine collaboration perspective, classroom evaluation should also assess whether students develop sound AI usage strategies and reflective capabilities, preventing "tools replacing thinking" [8].

4.4.3. Post-class assessment: transfer application and innovative presentation

Post-class evaluation primarily assesses students' transfer application abilities and innovative presentation skills, utilizing formats such as project reports, user validation records, outcome demonstrations (videos/posters/presentation slides), and reflective journals. Evaluation dimensions should center on "clear problem definition, sufficient validation evidence, closed-loop iteration logic, and effective expression/presentation" to ensure course objective attainment and continuous improvement [9].

Through a comprehensive, multi-faceted evaluation mechanism spanning pre-course, in-course, and post-course phases, the course simultaneously captures evidence across three domains: foundational knowledge, process competencies, and innovative outcomes. This approach provides students with clear pathways for improvement while generating traceable, analyzable evaluation data for curriculum reform, thereby better supporting the high-quality development of the "Innovation and Entrepreneurship Fundamentals" course in the context of artificial intelligence [10].

5. Conclusion

This paper explores classroom teaching reform approaches and implementation pathways based on the dual-integration model of OBE-BOPPPS, addressing the reform needs of the "Fundamentals of Innovation and Entrepreneurship" course in the AI context. The OBE philosophy emphasizes learning outcomes-based education, providing a clear "goal-process-evaluation" logical framework for constructing course objective systems, restructuring teaching content, and designing evaluation evidence. This facilitates the transformation of innovation and entrepreneurship courses from knowledge delivery to competency development. Concurrently, the BOPPPS model, guided by learning objectives and centered on participatory learning, translates outcome-oriented requirements into the organizational structure and feedback loops of each classroom session. This enhances classroom structuring and student engagement while improving the operational feasibility of teaching implementation.

Building upon this foundation, a systematic solution encompassing "outcome-oriented instructional redesign, closed-loop activation of BOPPPS classroom processes, integrated project-platform-competition practice support, and multi-dimensional evaluation spanning pre-class, in-class, and post-class phases" course reform aims to address common challenges in innovation and entrepreneurship classrooms, such as insufficient participatory learning, weak practical scenario support, and overly outcome-focused evaluation methods. This approach fosters students' critical competencies for the intelligent era, including opportunity identification, solution iteration, human-machine collaboration, and project presentation, thereby elevating the educational impact and course quality of innovation and entrepreneurship education.

Moving forward, deepening the reform requires further efforts in three areas:

(1) Strengthening teachers' capabilities in intelligent instructional design and human-machine collaborative teaching competencies to prevent technology application from remaining merely tool-base;

(2) Improve the supply of practical resources and the coordination mechanisms between schools and external partners to advance course practices from "classroom assignments" to "real-world validation," enhancing scenario authenticity and the potential for outcome transformation;

(3) Leverage process data and learning evidence to conduct long-term tracking and iterative feedback on learning outcomes, enabling courses to steadily improve quality through continuous refinement and achieving a leap from "technology application" to "value reconstruction" in innovation and entrepreneurship education.

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References

[1] Wu X, Han Y, Zhu S, et al., 2022, Reforming Cryptography Practical Competency Development through OBE and BOPPPS Integration. *Computer Education*, 2022(3): 98–101.

[2] Wang C, Chen Y, 2024, Application Research of Virtual Simulation Technology in International Trade Practice Teaching: Based on OBE Concept. *Modern Commerce and Industry*, 2024(24): 47–49.

[3] Zhang Y, et al., 2025, Research on the Transformation of Innovation and Entrepreneurship Education Models in the

Context of Artificial Intelligence. *Research and Practice in Innovation and Entrepreneurship Theory*, 2025(6): 45–50.

[4] Du P, et al., 2025, Research on Reform Pathways for Innovation and Entrepreneurship Courses in Higher Education Institutions under Digital Transformation. *Research on Higher Engineering Education*, 2025(2): 112–118.

[5] Gan L, Tian L, 2025, Research on AI-Empowered Innovation in Teaching Models for University Innovation and Entrepreneurship Courses. *Forum on Education and Teaching*, 2025(15): 96–100.

[6] Tang J, Li B, 2025, Research on the Transformation of University Classroom Teaching Models in the Context of Human-Machine Collaboration. *Modern Educational Technology*, 2025(4): 34–41.

[7] Tang J, et al., 2025, Research on the Integrated Application of OBE Philosophy and BOPPPS Teaching Model. *Chinese University Teaching*, 2025(3): 58–64.

[8] Xin J, et al., 2025, Research on Constructing a Course Evaluation System in Higher Education from an Outcomes-Based Perspective. *Research in Higher Education*, 2025(1): 83–90.

[9] Yao Z, Lian Z, 2025, Pathways for Digital Technology to Empower High-Quality Development of Innovation and Entrepreneurship Education. *Modern Education Management*, 2025(5): 72–78.

[10] Wei A, 2025, Opportunities and Challenges for Course Teaching Reform in Higher Education Institutions in the Era of Artificial Intelligence. *Research on Education Development*, 2025(8): 24–30.