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OBE-Based Experimental Teaching Models and the Cultivation of Application-Oriented Talents in Non-government Universities

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Abstract: Non-government universities shoulder the important mission of cultivating application-oriented talents, and experimental teaching serves as a key link in achieving competence orientation and quality development. In liberal arts experimental teaching, however, there remain several challenges. On the one hand, course objectives are insufficiently aligned with job requirements, and teaching design often remains at a theoretical level; on the other hand, although some universities have attempted to introduce virtual simulation platforms and project-based learning, the overall pathway still lacks systematic guidance. Grounded in the orientation of application-oriented education, this study proposes a curriculum system constructed through the six balanced dimensions, exploring optimization paths for liberal arts experimental teaching in non-government universities from overall design to teaching implementation. In doing so, it enriches localized research on experimental teaching in liberal arts, stimulates student initiative, enhances practical and innovative capabilities, promotes the integration of teaching and practice, and ultimately achieves the goal of cultivating application-oriented talents.

Keywords: Experimental teaching; OBE; Instructional design; Application-oriented talent development

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1. Introduction

Non-government universities play a vital role in cultivating applied talents within China's higher education system, and experimental teaching serves as a critical component for achieving application-oriented education and enhancing overall quality [1]. Compared to traditional theoretical instruction, experimental teaching more effectively stimulates student initiative, enhances practical and innovative abilities, and promotes closer alignment between teaching content and job requirements. Consequently, it has become a key pathway for achieving applied talent development goals. However, at present, institutions often exhibit a developmental bias toward science over the humanities, resulting in insufficient investment in liberal arts experimental instruction. Virtual simulation platforms' introduction lacks supporting mechanisms and course integration, yielding limited effectiveness and undermining motivation for sustained development [2]. Besides, students struggle to grasp the purpose of experimental courses, failing to intuitively recognize their significance. Insufficient knowledge transfer and practical application lead to weak recognition of these courses' value in competency development and career orientation. At the instructional implementation level, ambiguous course positioning, monotonous experimental design, and the absence of differentiated instruction and progressive learning pathways make it difficult to accommodate the developmental needs of students at different levels [3]. Simultaneously, teaching evaluation mechanisms remain formalistic and outcome-oriented, failing to authentically reflect the growth process of student competencies [4]. Overall, although domestic non-government universities have attempted reforms such as virtual simulation and project-based learning, humanities experimental teaching still lacks systematic guidance and comprehensive planning.

In Summary:

Universities: (1) Development prioritizes science over the humanities, with insufficient investment in humanities experimental construction. (2) The school introduced a virtual simulation platform, but its effectiveness was inadequate, leading to reduced investment.

Students: (1) Students lack a clear understanding of the purpose of experimental courses, making it difficult to grasp the significance of the curriculum design. (2) Knowledge transfer is challenging, and students lack awareness of how experimental courses cultivate skills and prepare for employment.

Teaching: (1) Ambiguous course positioning diminishes student initiative and sense of purpose. (2) Monotonous experimental design hinders differentiated instruction. Absence of progressive pathways fails to accommodate varying student abilities, limiting personalized development. (3) Evaluation practices become superficial, exhibiting a tendency to "prioritize form over substance," failing to accurately reflect competency growth.

2. Building a blended experimental teaching model guided by OBE

Based on the OBE philosophy and grounded in cultivating applied talents, the authors establish a six-dimensional alignment + three-type experiments + blended teaching model, as illustrated in **Figure 1**. Through "six balanced dimensions," the authors construct a precisely aligned course-experiment system. Corresponding to foundational, comprehensive, and exploratory experiments, adaptability and progression are enhanced. Integrating online and offline instruction with a "portfolio" multi-dimensional evaluation mechanism, a closed-loop system of "evaluation-feedback-optimization" is established. This strengthens students' key competencies in analysis, design, and practice, systematically supporting competency development goals under an outcomes-based framework.

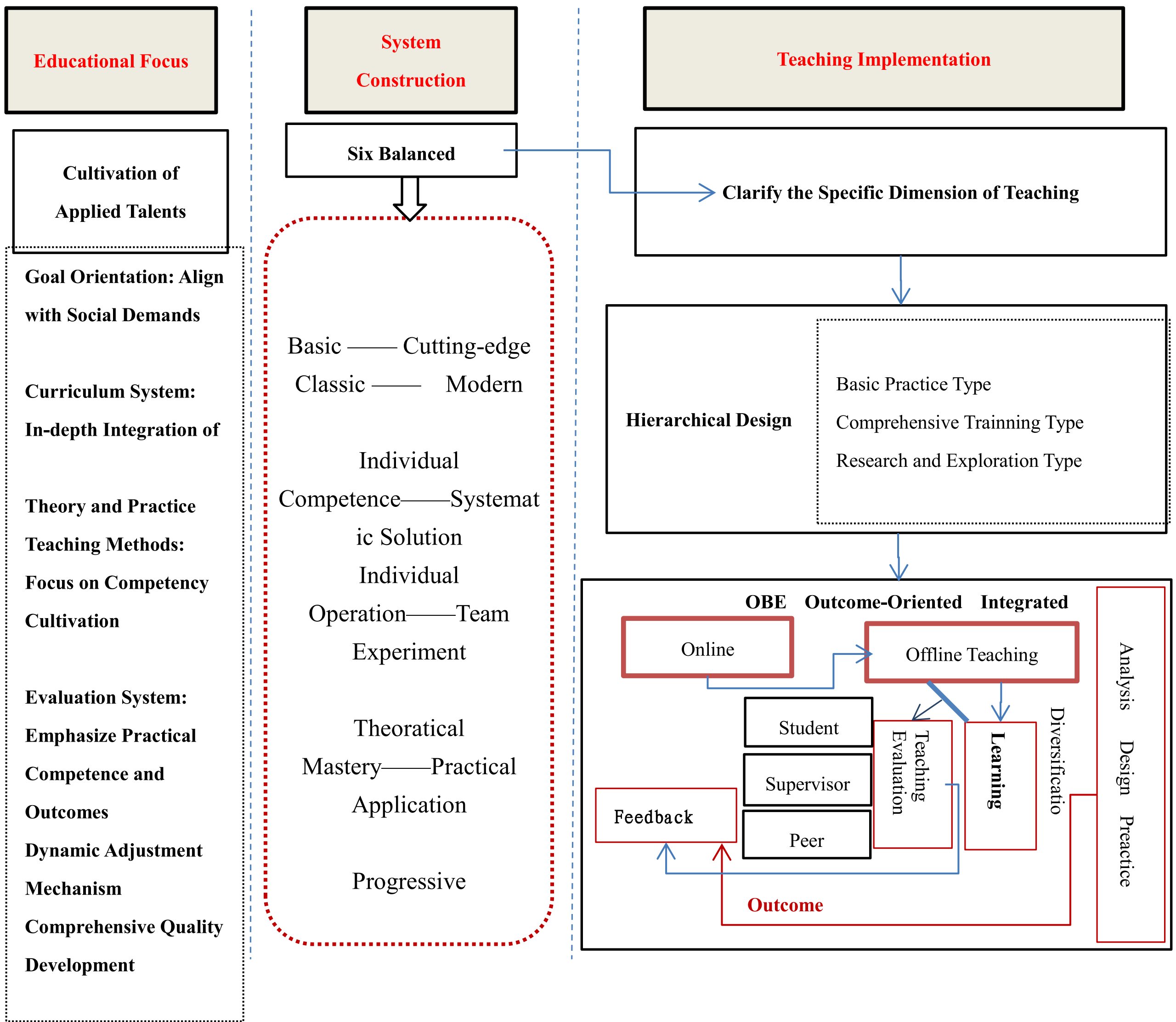

Figure 1. Overview of reform framework

3. Building six balances in the experimental system

(1) Balance between theory and practice: Closely integrate classroom knowledge with experimental components. In the "Cross-Cultural Communication" course, theoretical instruction is immediately followed by "Cross-Cultural Scenario Simulation Experiments", enabling students to test learned theories through "simulated reception of international clients."

(2) Balance between knowledge and skills: In the "News Writing" experimental course, students must master the five elements of news reporting while producing actual drafts that meet timeliness and logical structure requirements.

(3) Balance between teacher-led and student-centered approaches: By shifting from lecture-based teaching to guided collaborative learning, teachers transition from lecturers to designers and coaches, while students become active explorers.

(4) Foundational and cutting-edge balance: In text analysis instruction, students master fundamental analytical

methods while applying Python to process large-scale textual data.

(5) Unit and holistic balance: Utilize a “modular course design diagram” to map each teaching unit to its corresponding course objectives.

(6) Balancing classroom instruction and extracurricular competitions: Guide students to apply classroom learning to extracurricular research, innovation/entrepreneurship competitions, and internships, achieving an integrated “learn-practice-apply-compete” cycle. Through competitions like the “Challenge Cup” and “Internet Plus”, transform experimental course outcomes into competition projects or paper submissions.

4. Applying the correlation matrix for a tiered experimental design

Establish prerequisite tasks such as implementing courses, identifying target students, and assigning instructors. Construct a clear correlation matrix outlining essential student competencies and content. Conduct benchmarking analysis against talent development plans, course syllabi, and student learning needs [5]. Design tiered experimental difficulty levels based on students’ varying proficiency and capability. Additionally, course objectives undergo dynamic adjustments throughout the semester based on student practice reports, classroom responses, and the number/proportion of students participating in inquiry-based experiments.

At the knowledge level, foundational practice-oriented experiments serve primarily to help students understand and master basic facts, terminology, concepts, and methods. Through memorization and operational training, students gradually develop an understanding of underlying principles. At the competency level, experiments emphasize integrated design, stressing the application and synthesis of knowledge [6]. Students are required to utilize learned concepts and principles while solving complex practical problems by drawing upon cross-disciplinary knowledge and techniques during task completion. Regarding the quality dimension, the experimental course takes on a research-exploratory form, highlighting independent inquiry and innovation. It encourages students to conduct research practices based on existing knowledge, gradually developing innovative thinking and acquiring new knowledge outcomes.

After each course cycle concludes, eliminate outdated content, optimize integrated modules, and introduce cutting-edge topics through extracurricular research training guidance. This approach maximizes the alignment of experimental content with professional training objectives.

5. Experimental supermarket (self-directed learning) integrates flipped classroom methodology to advance tiered experimental instruction

Through the integrated practice of the “Experimental Supermarket Method + Flipped Classroom”, experimental instruction shifts from knowledge transmission to competency-based learning, effectively serving the fundamental goal of cultivating applied talent.

Before class, especially for foundational experiments, learning tasks can be assigned in advance, such as online video resources, virtual reality (VR) operation simulations, and online tools for quizzes/knowledge point assessments.

During class, the focus is on guiding students to independently identify problems, analyze them through group discussions, and solve them through hands-on practice. This enhances their engagement in course activities while incorporating teacher-student Q&A sessions into classroom assessment.

Post-class, comprehensive assessments are formed through multidimensional, full-process evaluation of Q&A

participation, lab reports, research output presentations, and engagement in inquiry-based activities. This enables visualization of competency attainment and tracking of growth trajectories.

This teaching model effectively hones students' practical problem-solving abilities, communication skills, innovative thinking, and continuous learning capabilities through hands-on practice. It contributes to the cultivation of application-oriented talents by integrating learning with practice and strengthening the linkage between industry and education [7].

6. Implementation of experimental instruction

6.1. Fundamental practice-oriented experiments

Fundamental practice-oriented experiments primarily consist of basic principle verification experiments (supplementary experiments for theoretical courses) and training in familiarizing students with equipment and software. For basic principle verification experiments, the number of foundational experiments and class hours is optimized and reduced, while training in basic instrument operation is strengthened. These experiments unfold in two phases: theoretical course preparation and experimental classroom execution. Instructors deliver theoretical lectures and demonstrations to assist students in observing and learning experimental phenomena, followed by software operation explanations to reinforce hands-on awareness. Students complete fundamental operational training through hands-on practice sessions and self-assessments.

6.2. Comprehensive design experiments

For integrated experiments, students engage in pre-class self-study (flipped learning) by reviewing instructor-provided experiment guides and micro-lectures covering core concepts and challenging topics. This prepares them to complete foundational knowledge reviews. During class, experiments are designed through a "group collaboration + problem-driven" approach. The teaching process from preparation to review comprises three stages: pre-class preparation, in-class implementation, and post-class reflection. Instructors guide pre-class self-study by posting learning objectives and uploading resources. During class, students complete tasks through group collaboration and problem-centered discussions. Post-class, closed-loop teaching management is achieved through Q&A sessions, platform exchanges, problem summarization, and assignment revisions.

6.3. Research exploration experiments

While foundational practice experiments and integrated design experiments cultivate core professional competencies, interdisciplinary research exploration experiments serve as pivotal activities for developing students' innovative capabilities and interdisciplinary integration skills—laying the groundwork for future innovation. Leveraging experimental course platforms, incubation bases, and faculty research resources, these experiments employ "group-based" or "project-based" guidance models for highly motivated students.

Encourage students to independently design experimental protocols, conduct literature reviews, and draft short papers or project proposals centered on core disciplinary questions.

Regularly organize academic workshops to impart research methodologies, data analysis tools, and scientific writing techniques.

Support student participation in faculty-led horizontal or vertical research projects to enhance comprehensive competencies through real-world applications.

From the preparatory phase through research implementation to final reflection, this approach comprehensively outlines the organizational framework for extracurricular research activities. Teachers leverage competitions to drive learning and guide research, helping students clarify research directions, master scientific methodologies, and complete project-based assignments. Students progressively enhance their research literacy through presentations, research notebooks, and project proposal submissions, while timely group discussions facilitate reflection on achievements and shortcomings. The above experimental teaching plan can be adjusted and redesigned based on subject characteristics, instructor preferences, and student experimental capabilities to better suit diverse teaching scenarios.

6.4. Optimizing experimental teaching through portfolio documentation in the evaluation system

Current university experimental teaching practices—including increased formative assessment, strengthened evaluators, and clarified standards—already provide robust support for student holistic development. Supplementing these diverse systems with a "portfolio" approach allows instructors to extract materials like homework assignments, in-class experiments, quizzes, course designs, and extracurricular projects after a teaching phase. Students may also create classroom Q&A logs or experimental self-reflection forms. The "portfolio" approach begins with the course's learning outcomes (expected achievements) and then works backward to design and plan course content, teaching strategies, and evaluation systems. This method continuously addresses students' actual developmental needs.

6.5. Promotion

The "Six-Dimensional Comparison + Three-Type Experiments + Blended Learning" model proposed in this study serves both as an optimization solution for the current state of liberal arts experimental teaching and as a scalable educational innovation pathway. At the institutional level, this model can serve as a paradigm for experimental teaching reform in non-government universities, applicable to restructuring course systems across disciplines to foster an interdisciplinary, diversified experimental teaching ecosystem. At the regional level, through inter-institutional collaboration and resource sharing, the model can be scaled as a universal solution for building humanities experimental teaching alliances, enabling interoperability of experimental platforms, course resources, and evaluation mechanisms. Furthermore, at the policy level, this model provides education authorities with actionable reform references, facilitating the integration of outcome-based approaches under OBE principles into teaching quality assessments and professional accreditation metrics. At the societal level, its implementation will effectively enhance students' job readiness and innovation/entrepreneurship capabilities, deepen university-industry collaboration, and provide a continuous supply of applied talents to support local economic development and industrial upgrading.

7. Conclusion

This study addresses challenges in liberal arts experimental teaching at non-government universities, including fragmentation, ambiguous objectives, and ineffective evaluation. By introducing OBE outcomes-based principles and constructing a "course-competency-outcomes" correlation matrix, it facilitates seamless alignment between teaching objectives and competency development. Leveraging a "six-dimensional tiered approach + three types of experiments + blended learning" pathway, it integrates the experiment supermarket with the flipped classroom to strengthen students' practical and innovative capabilities. This provides a systematic and scalable teaching model for cultivating applied talents in non-government universities, while also offering a reference framework for scholars dedicated to experimental teaching.

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Disclosure statement

The authors declare no conflict of interest.

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