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Exploration of Case-based Industry-university Collaborative Teaching Mode

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Abstract: This study explores an industry-university collaborative case teaching model within industry-education integration, constructing a mechanism encompassing case development, classroom implementation, and effectiveness evaluation. In development, a demand-oriented topic selection mechanism, standardized writing processes, and a dynamically updated case library ensure industrial authenticity and teaching applicability. In implementation, a dual-mentor collaborative model builds cognitive foundations pre-class, promotes in-depth discussion through complementary roles during class, and facilitates knowledge internalization post-class, integrating theoretical teaching with practical training. In evaluation, a multi-dimensional system covering student outcomes, teaching quality, and long-term value integrates process and summative assessments, multi-source feedback, and alumni tracking with corporate feedback, forming a virtuous cycle of teaching optimization responding to industrial demands. This model addresses traditional case teaching's disconnection from industrial reality, providing a pathway for deepening industry-education integration and cultivating high-quality application-oriented talents.

1. Introduction

Against the backdrop of the national strategy for deepening industry-education integration, higher education is facing an urgent need to transition from knowledge transmission to competency cultivation. As an important bridge connecting universities and enterprises, industry-education integration aims to break down barriers between education and industry, cultivating high-quality application-oriented talents that meet industrial demands through resource sharing and collaborative education. The case teaching method, with its unique advantage of cultivating students' analytical and decision-making abilities in authentic contexts, has become an effective vehicle for achieving the teaching objectives of industry-education integration[1]. However, traditional case development mostly relies on instructors writing cases based on secondary sources, which presents problems such as disconnection from industrial reality and lack of timeliness, making it difficult to support the systematic cultivation of students' practical abilities. Based on this, exploring an industry-university collaborative case teaching model holds significant practical importance[2,3]. This model ensures that case materials originate from authentic industrial scenarios through deep enterprise participation in

case topic selection, writing, and review; achieves organic integration of theoretical teaching and practical training through dual-mentor collaborative guidance in classroom implementation; and continuously optimizes teaching effectiveness through multi-dimensional evaluation systems, forming a virtuous cycle of interaction between teaching and industry[4-6]. The construction and implementation of this model can not only effectively enhance the quality and effectiveness of case teaching but also provide an actionable implementation pathway and practical reference for deepening industry-education integration and innovating talent cultivation mechanisms.

2. Development and Co-construction Mechanisms for Industry-University Collaborative Cases

The quality of industry-university collaborative case development is crucial for effective case-based teaching in industry-education integration. Unlike traditional teacher-driven approaches using secondary sources, a co-creation mechanism involving both academic mentors and industry experts ensures authenticity and industrial relevance[7]. This approach creates cases that serve as practical learning tools for students while providing valuable references for enterprises addressing real-world challenges.

2.1 Demand-oriented Case Topic Selection Mechanism

The scientific nature and applicability of case topic selection form the cornerstone of the value of case-based teaching. Traditional models, due to a lack of deep involvement from enterprises, often lead to topics that lean toward theoretical abstraction and become disconnected from industrial realities. The core of industry-university collaborative topic selection lies in establishing a process of enterprises proposing needs, schools evaluating value and both parties jointly validating, ensuring that the selected topics not only originate from industrial pain points but also closely align with teaching objectives.

As the provider of topics, enterprises need to identify specific, genuine challenges from their core operations, such as efficiency bottlenecks in specific production stages or market decision-making dilemmas, and provide relevant contextual details, constraints, and existing measures to ensure the topics are grounded in solid real-world scenarios.

School instructors, on the other hand, evaluate the potential value of topics from a teaching perspective based on three key criteria: theoretical relevance, i.e., whether the topic can be organically integrated with the core knowledge points of the course; cognitive challenge, i.e., whether it contains meaningful contradictions or decision-making dilemmas worthy of in-depth exploration; and capability alignment, i.e., whether the difficulty level matches the students' existing knowledge and experience.

Finally, both parties jointly confirm the topic through dedicated validation meetings. During these meetings, enterprises clarify the background and industrial significance of the topic, while instructors analyze its alignment with teaching objectives and expected educational outcomes. Together, they identify and address potential issues such as information completeness or business confidentiality. Through multiple rounds of negotiation, a topic that balances industrial authenticity and teaching applicability is established, laying a solid foundation for subsequent case development.

2.2 Standardized Case Writing and Review Process

Case development is a critical step in transforming real-world business problems into teachable materials. Its core lies in balancing industrial authenticity with pedagogical applicability. This requires establishing a standardized process to convert raw corporate materials into logically structured teaching cases suitable for classroom discussion.

In this process, enterprises bear the responsibility for ensuring authenticity. They must provide first-hand, original materials related to the selected topic, such as internal reports, data charts, and procedural documents, to ensure the case accurately reflects the context of the problem. At the same time, enterprises need to desensitize information involving trade secrets, protecting core confidential details without compromising the true nature of the problem.

Academic instructors are responsible for the pedagogical adaptation of the raw materials. Their primary task is to organize and reconstruct complex information, extract key details, and structure the content around a logical framework of backgrounds, problems and decision points, creating a clear narrative flow for the case. Additionally, instructors must design layered guiding questions that lead students from comprehension and analysis to decision-making, thereby transforming real problems into effective learning tools.

Once the case is drafted, it must undergo a joint review by both the enterprise and the academic institution to ensure factual accuracy and pedagogical suitability. Corporate experts focus on verifying whether the factual details align with the actual situation of the enterprise, while instructors evaluate whether the teaching logic and question design align with educational objectives and students' cognitive levels. Both parties review the case based on the principle of integrating authenticity with pedagogical value, discussing, and adjusting any points of concern. Only cases approved through this joint review process are incorporated into the teaching resource library, truly serving the educational mission.

2.3 Dynamically Updated Case Library Management and Sharing Mechanism

Industry-university collaborative cases are not static, long-term materials. As industry technologies iterate, market environments change, and corporate development strategies adjust, original cases may gradually lose their timeliness and representativeness. Therefore, establishing a dynamically updated case library management and sharing mechanism is key to ensuring that case-based teaching remains aligned with industrial development and educational needs over the long term, keeping the case library consistently fresh and practical.

The case library's dynamic updating relies on a regular joint review mechanism between the university and enterprises. A case review meeting should be held each semester, involving enterprise experts, academic instructors, and student representatives. From an industrial perspective, experts assess whether the case remains relevant to current industry realities. From a teaching perspective, instructors evaluate its effectiveness, including student understanding and discussion depth. Cases lagging behind development are marked for updating or elimination.

To improve the utilization efficiency of case resources, a collaborative digital case platform should be built, enabling the sharing, classification, and convenient retrieval of cases. The platform's functional design needs to balance both management and usage requirements. In terms of management functions, it should support joint maintenance of case information by both parties: enterprise experts can upload new materials and update industry dynamics related to cases, while academic instructors can upload revised case texts and record teaching feedback. The platform should automatically log metadata such as case development time, update time, and usage frequency, providing data support for reviews and updates. In terms of usage functions, a multi-dimensional case classification system needs to be established, allowing cases to be tagged and categorized by industry field, problem type, teaching objective, etc., making it convenient for instructors to instantly search for suitable cases based on course needs. Additionally, the platform can set case usage permissions to ensure the secure use and orderly sharing of case resources.

3. Implementation of the Process of Dual-mentor Guided Case-based Classrooms

Amid industry-education integration, dual-mentor case classrooms transcend traditional teaching by merging academic expertise with industrial practice. This closed-loop model—theory-guided, practice-interrogated, and dual-reflection—fosters collaborative mentor interaction, enabling students to grasp theoretical logic and real-world complexity, ultimately transforming knowledge cognition into applied capabilities[8].

3.1 Pre-class Preparation: Dual-mentor Collaborative Groundwork for Building Case Cognition Foundation

Pre-class preparation is the foundation for the efficient execution of a case-based classroom, with its core objective being to help students familiarize themselves with the case background in advance and establish a preliminary analytical framework, thereby ensuring they are fully prepared for classroom discussions. At this stage, a clear division of labor and collaborative coordination between the dual mentors is essential to support students from both theoretical and practical dimensions, preventing difficulties in classroom participation caused by students' unfamiliarity with the industrial background or insufficient theoretical preparation.

As the core guide of instruction, the academic mentor must prioritize systematically organizing and distributing the case materials. First, the case text needs to be structurally processed. In addition to the core case description, it should be supplemented with prompts regarding the theoretical knowledge involved. For example, if the case revolves around production process optimization, brief annotations on potential process analysis tools and efficiency evaluation methods should be included to help students instantly connect with the theories they have learned. Second, layered and progressive core thinking questions should be designed, avoiding simple factual inquiries and instead focusing on analysis and decision-making. Finally, the academic mentor should clearly communicate pre-class task requirements to students in advance, including key points for writing individual analysis reports, suggested directions for information retrieval, and the rules for classroom participation, ensuring that students' pre-class preparation is more targeted.

The corporate mentor, on the other hand, needs to supplement the case background information from an industrial practice perspective, helping students understand the real-world business environment in which the case is situated. For example, if the case involves adjustments to market strategy, the corporate mentor could provide materials on the current market competition landscape, trends in consumer demand changes, and characteristics of mainstream business models within the industry, enabling students to grasp the external constraints on the enterprise's decision-making in the case. If the case involves solving a technical challenge, the corporate mentor could share insights into the development stage of the relevant technological field, common industry technical standards, and the pros and cons of typical technical implementation solutions, offering practical references for students' technical analysis. Additionally, the corporate mentor could address students' industry-related questions encountered during pre-class preparation through online communication channels, such as explaining the practical operational difficulties of a specific production process or the internal approval procedures for a certain type of management decision within an enterprise. This helps students eliminate blind spots in practical understanding, laying a solid foundation for in-depth classroom discussions.

3.2 In-class Discussion: Complementary Roles of Dual-mentors for Fostering Deep Intellectual Exchange

In-class discussion is the core link of case-based teaching, and its key lies in stimulating students'

multi-dimensional thinking through the differentiated guidance of dual mentors, advancing the discussion from superficial phenomenon analysis to deep problem exploration. At this stage, dual mentors need to clearly define their roles: the academic mentor focuses on controlling the discussion rhythm and deepening theoretical analysis, while the corporate mentor focuses on introducing practical perspectives and questioning the feasibility of solutions, forming an interactive pattern of theoretical guidance and practical calibration, preventing the discussion from degenerating into unfocused generalities or idealized analysis divorced from reality.

The academic mentor organizes discussions, activating thinking with opening questions from pre-class reports. During progression, they employ heuristic questioning to deepen analysis while keeping discussions focused on core issues. They ensure balanced participation by encouraging quieter students to share views, fostering an open atmosphere where all engage in intellectual exchange.

The corporate mentor, grounded in industrial practice experience, plays the roles of practical inquirer and context restorer. Rather than directly providing standard answers, they help students recognize the complexity of practical decision-making through introducing real-world scenarios and questioning solution feasibility. When students propose analytical hypotheses or solutions, the corporate mentor raises questions from an industrial operational perspective. Meanwhile, they can share practical experiences from similar cases based on their own experiences Through restoring specific contexts, students understand the gap between theoretical solutions and practical implementation. Additionally, when discussions become deadlocked by disagreements, the corporate mentor can guide students to focus on core demands from an industrial purposeful perspective, helping them find decision-making balance among multiple objectives.

3.3 Post-class Summary: Bidirectional Empowerment of Dual Mentors for Internalizing Knowledge and Competencies

The post-class summary stage is crucial for solidifying the outcomes of case-based teaching. Its core objective is to help students organize their discussion findings, deepen their theoretical understanding, and absorb practical experience, thereby achieving a leap from specific case analysis to the enhancement of universal competencies. At this stage, dual mentors need to collaborate on the summary from both theoretical and practical dimensions, systematically consolidating the case knowledge while deeply integrating theory with practice. This enables students to utterly understand how theory guides practice and how practice, in turn, enriches theory.

The academic mentor focuses on theoretical refinement and synthesis, helping students construct a systematic knowledge framework. First, they need to organize the theoretical knowledge points touched upon during the in-class discussion, integrating the various analytical tools and decision-making models mentioned. They should clarify the applicable scenarios and limitations of different theories within the case analysis to prevent students from forming the misconception that a single theory can solve all problems. Second, they need to extract universal analytical logic and methodologies from the case. Finally, they need to guide students in theoretical reflection, organizing discussions on whether the application of theories achieved the expected results and analyzing the reasons for any discrepancies. This process allows students to deepen their understanding of theory through reflection and enhance their flexibility in applying it.

The corporate mentor helps students grasp real-world decision-making complexity. First, they share actual decision processes, information gathering, key considerations, internal disagreements—showing that decisions balance resource constraints, team dynamics, and market changes. Second, they present real results and impacts, including achievements and problems, avoiding notions of perfect decisions. Finally, they comment on student solutions, acknowledging strengths while pointing out implementation challenges, such as theoretical solutions facing practical barriers. This

cultivates pragmatic decision-making by highlighting gaps between theory and practice.

4. Multi-dimensional Evaluation and Feedback System for Case Teaching Effectiveness

Evaluating case-based teaching is key to quality optimization. It assesses goal achievement, identifies strengths and weaknesses, and guides adjustments while verifying support for industry-education integration. Moving beyond paper-based tests, a multi-dimensional system covering learning outcomes, teaching quality, and long-term value is needed[9]. Involving both academic and corporate entities throughout the cycle, it shifts evaluation from result judgment to comprehensive process optimization.

4.1 Evaluation of Student Learning Outcomes: Bidirectional Synergy between Process and Summative Assessments

The evaluation of student learning outcomes must transcend the limitations of a score-only approach, balancing dynamic performance during the learning process with the final outcomes of knowledge application. Process assessment captures students' growth trajectories throughout case-based learning, while summative assessment tests their comprehensive application abilities, forming an evaluation chain where process tracking and result verification support each other. This evaluation process requires the joint participation of both academic and corporate mentors, ensuring that evaluation criteria align with educational principles while remaining close to the demands of industrial practice.

Process assessment evaluates students' participation depth, thinking quality, and collaboration through observation. Pre-class, mentors assess background understanding and theory connection via preparation notes. During class, academic mentors observe logical thinking and theoretical application, while corporate mentors focus on practical awareness and teamwork. This includes whether students consider real-world constraints, engage in constructive discussion, and integrate diverse views to refine analytical approaches, ensuring students participate deeply and develop comprehensive problem-solving skills.

Summative assessment primarily uses students' submitted case analysis reports or solution proposals as its primary medium, focusing on evaluating students' comprehensive ability to transform theoretical knowledge into practical applications. The key to this evaluation lies in dual mentors jointly developing scientific, detailed evaluation criteria that reflect both theoretical depth and practical feasibility. The evaluation criteria can be structured around following four core dimensions:

1) Theoretical relevance: whether the analysis report accurately matches case problems with core course theories, and whether the application of theory feels natural rather than forcibly assembled.

2) Practical feasibility: whether the proposed solutions fully consider constraints such as resource conditions, operational processes, and cost budgets in actual industrial contexts, and whether they have potential for implementation.

3) Logical completeness: whether the analytical process follows a complete logical chain of problem identification, cause analysis, solution design, and risk assessment, with each step supported by adequate justification.

4) Innovativeness and constructiveness: whether the solutions contain innovative elements beyond conventional thinking, or offer unique analytical perspectives on case problems, demonstrating students' independent thinking capabilities.

4.2 Evaluation of Case Teaching Quality: Integration of Multi-source Feedback and Collaborative Reflection

The evaluation of case teaching quality needs to use whether it adapts to student needs, aligns with industrial reality, and achieves teaching objectives as its core benchmarks. By collecting multi-dimensional information such as student feedback and dual-mentor reflections, it comprehensively diagnoses problems within the teaching process, providing a basis for case optimization and instructional improvement. This evaluation not only focuses on the teaching effectiveness of individual cases but also emphasizes uncovering common issues in teaching collaboration, promoting the overall upgrading of the case teaching system.

Student feedback is essential for evaluating teaching quality and should be systematically collected. It focuses on three levels: case quality—whether content reflects real industrial scenarios, difficulty matches student levels, and problems offer analytical value; dual-mentor effectiveness—clarity of theoretical guidance, practical insights filling knowledge gaps, smooth cooperation, and engagement stimulation; and discussion organization—appropriate pace, sufficient time for expression, inclusive atmosphere, and deepened understanding of case issues.

Dual-mentor collaborative reflection constitutes a critical link in the self-diagnosis of teaching quality and needs to be conducted promptly after each round of case teaching, focusing on in-depth discussion of specific issues within the teaching process. Reflection content can also be organized around four dimensions:

1) Reflection on case suitability: whether the case difficulty was too high or too low leading to insufficient student participation, whether the industrial scenarios involved in the case match students' future career directions, and whether the theoretical knowledge points carried by the case are clearly defined.

2) Reflection on teaching pace: whether pre-class preparation time was sufficient for students to fully understand the case, whether the time allocation for in-class discussions was reasonable avoiding any segment becoming overly lengthy, and whether the summary and enhancement phase effectively addressed student questions and confusions.

3) Reflection on collaborative coordination: whether the role division between dual mentors was clear avoiding overlapping or omitted responsibilities, whether timely backup was possible during in-class discussions to manage unexpected situations, and whether perceptions of student evaluation criteria were consistent avoiding scoring deviations.

4) Reflection on goal achievement: whether this case teaching session achieved the preset knowledge and capability objectives, in which areas students still show significant deficiencies, and how subsequent teaching strategies need to be adjusted to improve these shortcomings.

4.3 Evaluation of the Long-Term Value of Case-Based Teaching: Linking Alumni Tracking and Corporate Feedback

The long-term value of case-based teaching is not only reflected in students' short-term knowledge acquisition and ability enhancement but also in the sustained support that the cultivated thinking patterns and analytical methods provide for students' careers, as well as their contribution to corporate talent selection and industrial development. Therefore, it is necessary to establish a long-term tracking evaluation mechanism that verifies the enduring value of case-based teaching through alumni feedback and corporate participation, while simultaneously feeding back into teaching optimization and strengthening both parties' confidence and willingness to participate in case-based teaching.

Alumni tracking evaluation focuses on the application of competencies cultivated through case-based teaching in actual work contexts. Its core objective is to understand whether the analytical frameworks and decision-making thinking developed during case teaching effectively address real-

world problems after students enter the workplace. Schools can establish alumni growth profiles and maintain regular communication with graduates through various methods, including online questionnaires, one-on-one interviews, or alumni symposiums. The tracking content needs to address three core questions:

1) Whether the competencies cultivated through case-based teaching are applicable? For example, whether students apply problem decomposition methods and risk assessment approaches learned from case discussions to analyze business problems in their work, and whether they can quickly adapt to job requirements using the industrial knowledge accumulated from cases.

2) How effective is the application of these competencies? For instance, whether the thinking patterns developed through case teaching have helped students propose innovative solutions, solve complex problems at work, or positively influenced their career advancement and capability development.

3) What suggestions for improving case teaching? For example, which types of industry cases students would have preferred more exposure to during their studies, and whether the guidance approach of dual mentors needs further optimization to better bridge workplace demands.

Corporate feedback validates case teaching's industrial value. By observing student performance in case discussions, enterprises assess analytical abilities and professional competencies for talent selection. Outstanding students may gain internship or employment priority. This teaching-selection link provides enterprises with precise talent channels while helping students understand corporate requirements, enhancing learning relevance.

5. Conclusions

This study proposes and systematically elaborates on a case-based industry-university collaborative teaching model. The model establishes mechanisms for demand-oriented case topic selection, standardized writing and review processes, and dynamically updated case library management, ensuring that teaching cases remain synchronized with industrial frontiers. In classroom implementation, dual-mentor collaborative guidance is adopted, forming a teaching closed-loop through pre-class groundwork, complementary roles during class, and post-class empowerment, facilitating students' transformation from knowledge cognition to capability internalization. In effectiveness evaluation, multi-dimensional assessments integrating student learning outcomes, teaching quality, and long-term value are incorporated, forming a continuous improvement mechanism. This model achieves deep coupling between educational resources and industrial demands, providing theoretical support and practical reference for local universities to deepen industry-education integration and innovate application-oriented talent cultivation.

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