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Research on an OBE-Based Industry Chain Collaborative Cultivation Model for Part-Time Postgraduates

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Abstract: Part-time postgraduate education, as a key component of the lifelong education system, is increasingly vital within the talent cultivation framework. Addressing current issues such as the academic orientation of goal-setting, superficial industry-education collaboration, and the singularity of quality evaluation in part-time postgraduate education, this study constructs a multi-dimensional cultivation model of "Objective Chain-Curriculum Chain-Practice Chain-Evaluation Chain" based on the OBE concept and Industry Chain Collaboration theory. Through a demand anchoring mechanism, it precisely aligns with regional industry talent needs. A modular curriculum system enables progressive competency development. Multi-platform collaboration among government, enterprises, and universities resolves resource fragmentation. A multi-dimensional dynamic evaluation system is established. This drives a paradigm shift from discipline-oriented to industry-demand-oriented cultivation, effectively resolving structural contradictions like the disconnection in professional competency development and inefficient university-enterprise collaboration. It provides a transplantable practical pathway for part-time education in local industry-specific institutions.

1. Introduction

In recent years, with the transformation and upgrading of industries and the profound changes in the talent demand structure in our country, part-time postgraduate education, as a key link in the lifelong education system, has become increasingly valuable in the talent cultivation system. The Ministry of Education's "Notice on Coordinating the Management of Full-time and Part-time Postgraduate Students" explicitly requires "adhering to the same standards and ensuring the same quality" [1-2]. At present, the enrollment of part-time postgraduate students has been expanding, and the trend of integration of industry and education in postgraduate training has been deepening. Some institutions, especially local ones, still face some structural contradictions in the training practice: one is the disconnection between the academic tendency of the target orientation and the demand for professional ability [3]. The traditional training model transplants the framework of full-time academic master's degree students, overemphasizes the integrity of the disciplinary knowledge system, and neglects the career development demands of part-time postgraduate students

as on-the-job learners; The second is the shallowness of industry-education collaboration and the predicament of resource integration [4]. Although the "National Pilot Implementation Plan for Industry-Education Integration" proposed to "promote the organic connection between the education chain, the talent chain and the industrial chain, the innovation chain", local colleges and universities are limited by their resource endowments, and school-enterprise cooperation mostly remains at superficial interactions such as signing agreements and hanging up internship bases; The third is the singularity of quality evaluation and the absence of a dynamic feedback mechanism. The current quality assessment of training mainly relies on course examinations and thesis defenses, lacking multi-dimensional assessment of professional competence [5-7]. Based on this, this study takes Hubei University of Automotive Technology as the theoretical construction carrier to explore the industrial chain collaborative training model of local industry-specific colleges based on the OBE concept.

The OBE (Outcome-Based Education) concept was formally proposed by American scholar Spady in 1981. Its core proposition subverts the traditional "input-oriented" educational paradigm and emphasizes an educational model that is "oriented towards students' final learning outcomes". The introduction of OBE in China's higher education sector began in the field of engineering education accreditation. The team led by Gu Peihua from Shantou University combined the OBE concept with the CDIO (Concept-Design-Actual-Operate) model to construct a "design-oriented" engineering education system [8]. The industrial chain collaborative education theory, which originated from the innovation ecosystem theory, emphasizes the symbiotic relationship among the education chain, the talent chain, the industrial chain and the innovation chain. The "Four-chain cycle model" proposed by Zhang Qingmin et al. states that the education chain provides knowledge supply to the talent chain, the talent chain drives the upgrading of the industrial chain through technological innovation, and the innovation chain, as a value-added hub, converts educational output into industrial productivity, forming a positive cycle of "talent cultivation - technological breakthrough - industrial upgrading - educational innovation".

2. Construction of a Training Model Based on Four-Chain Collaboration

The OBE (Outcome-Based Education) concept was formally proposed by American scholar Spady in 1981. Its core proposition subverts the traditional "input-oriented" educational paradigm and emphasizes an educational model that is "oriented towards students' final learning outcomes". The introduction of OBE in China's higher education sector began in the field of engineering education accreditation. The team led by Gu Peihua from Shantou University combined the OBE concept with the CDIO (Concept-Design-Actual-Operate) model to construct a "design-oriented" engineering education system. The industrial chain collaborative education theory, which originated from the innovation ecosystem theory, emphasizes the symbiotic relationship among the education chain, the talent chain, the industrial chain and the innovation chain. The "Four-chain cycle model" proposed by Zhang Qingmin et al. states that the education chain provides knowledge supply to the talent chain, the talent chain drives the upgrading of the industrial chain through technological innovation, and the innovation chain, as a value-added hub, converts educational output into industrial productivity, forming a positive cycle of "talent cultivation - technological breakthrough - industrial upgrading - educational innovation" [9-11].

Innovation in the training model for part-time postgraduate students requires breaking through the traditional academic path dependence [12]. This study, based on the inherent coupling logic of the OBE concept and the industrial chain synergy theory, systematically constructs a four-dimensional theoretical framework including the target chain, course chain, practice chain, and evaluation chain, achieving a fundamental transformation of the training paradigm from

"discipline-oriented" to "industry demand-oriented".

2.1 Chain of Goals

The objective chain is the logical starting point of the training model, essentially transforming the vague "requirements for talent quality" into an operable and evaluable "system of competency indicators". According to the reverse design principle of the OBE concept, the construction of the goal chain should follow a three-stage transformation path: first extract the capability dimension through the analysis of the talent demand in the industrial chain, then use the capability modeling tool to deconstruct the indicators, and finally achieve the precise mapping of capability goals to the curriculum system. At the demand analysis level, local industry-specific institutions need to base themselves on regional industrial endowments. Take Hubei University of Automotive Technology as an example. Based on the three leading industrial chains of new energy vehicles, intelligent connected vehicles, and automotive finance, it conducts vocational ability analysis in collaboration with enterprises such as Dong Feng Motor and CATL to identify the core competence groups that part-time postgraduate students need to possess. In terms of the methodology of competency modeling, it is necessary to take into account the dialectical unity of academic and vocational aspects. Crucially, the target chain should be embedded with vocational qualification standards to achieve substantial equivalence between academic education and professional qualification education.

2.2 Curriculum Chain

The curriculum chain is the vehicle for achieving competency goals, and its design must break free from the logical constraints of disciplinary knowledge. This study proposes a modular curriculum system: basic modules undertake the function of constructing the knowledge system, but beware of the trap of "undergraduate curriculum repetition". Knowledge should be reorganized with a problem-oriented approach to ensure that theoretical teaching always points to the ability goals; Industry modules are the core carriers that reflect local characteristics. The development of their content requires the collaboration of the government, schools and enterprises, including the dynamic update of course content, the development of characteristic course clusters, and the creation of interdisciplinary courses, which can solve the chronic problem of "course content lagging behind industrial transformation". The practice module is a touchstone for testing capabilities, and its design must adhere to the principles of real scenarios, real problems, and real outputs.

2.3 Practice Chain

The practice chain is the material basis for the implementation of the training model, building a multi-platform collaborative mechanism of government, schools and enterprises, and achieving deep integration of the education chain and the industrial chain through resource complementarity and value circulation. The college platform focuses on building industrial scenario simulation systems to help students conduct data-driven decision-making training, making up for the time and space limitations of traditional practical training; The core of the enterprise platform is the establishment of a "project feedback mechanism", where enterprises provide real problem databases and research results feed back to teaching and research. This design transforms enterprises from "resource suppliers" to "value co-creators". The government and business platform, on the other hand, plays the role of resource integration and institutional guarantee. This multi-subject collaborative network is an institutional innovation to break through the resource bottleneck of local

colleges and universities.

2.4 Evaluation Chain

A multi-agent capability Achievement assessment system The evaluation chain is a core link in quality assurance, and its reform requires multi-dimensional shifts, from knowledge memory evaluation to ability application evaluation, from single academic evaluation to multi-subject evaluation, and from static outcome evaluation to dynamic development evaluation. In terms of the design of evaluation subjects, enterprises, as the ultimate users of talents, can best reflect the essence of professional competence through their evaluations; At the level of evaluation methods, a dynamic tracking system that takes into account both process and outcome can be established, and it is particularly important to introduce third-party career evaluation; The application of evaluation results constitutes a continuous improvement loop, with comprehensive feedback improvements based on aspects such as graduate interviews, mentor evaluations, and enterprise satisfaction. This evidence-based improvement mechanism embodies the essence of "continuous quality improvement" in the OBE concept.

3. Implementation Paths and Safeguards Mechanisms

3.1 Institutional Safeguards System

Training institutions should establish a curriculum mapping mechanism based on the industrial chain capability spectrum, driven by capability goals, deeply coupling academic goals with industrial demands to achieve the principle of consistency of "goals - courses - capabilities". At the same time, a complementary ability mechanism between academic mentors and enterprise mentors should also be established. Academic mentors regularly participate in the technical management of enterprises and use the funding for horizontal projects as a core indicator to drive the role of teachers to shift from knowledge transmission to practical guidance. Establish a hierarchical enterprise mentor certification system, invite enterprises related to the industrial chain to participate in the revision of the training program, and moderately undertake on-site teaching tasks, optimize the allocation of teachers through two-way anonymous evaluation at the end of each academic year, and achieve a dynamic match between mentors' capabilities and industrial demands through the "common leading, differential optimization" strategy.

3.2 Deep integration of Resources

The advanced form of resource integration is the continuous transformation of industrial problems into educational values. Training institutions need to establish a regular collection mechanism for enterprise technical problems, and after academic evaluation, form a research guide for industry-education integration to ensure that the problem pool is deeply connected to the cutting-edge demands of the industry. The optimized solutions formed by the efforts of teachers and students, after being verified by enterprises, are structured and refined to be transformed into modular teaching cases, embedded in the core modules of professional courses to achieve the transformation of implicit experience into explicit knowledge. Ultimately, the series of research results are integrated to form an industrial chain decision support think tank, which feeds back to the enterprise's strategic adjustment and policy-making. The path builds a three-level leap channel from practical problems to theoretical tools: technical challenges are transformed into teaching resources, solutions are elevated to knowledge products, educational outputs empower industrial upgrading, and form a self-reinforcing resource value-added cycle.

3.3 Quality closed-loop system

Training units need to build a data-driven, dynamically responsive, closed-loop validated quality assurance system to achieve a spiral improvement in the quality of talent cultivation through multi-dimensional quality monitoring. The core of quality monitoring lies in establishing a quantifiable and traceable capacity assessment scale. Training units can build a multi-dimensional competency evaluation system, generate a dynamic competency map of students on a regular basis, and identify individual competency weaknesses through visual gap analysis. Build a database of graduates' career development simultaneously, continuously track core indicators such as the rate of job promotion, salary growth rate, and conversion rate of innovation achievements of graduates, and form a baseline for long-term quality evaluation. The enterprise satisfaction diagnostic tool focuses on industry-sensitive dimensions such as the timeliness of knowledge application and the effectiveness of solutions, and sends structured questionnaires to partner enterprises every quarter to convert industry feedback into quality improvement coordinates.

4. Conclusion

Based on the OBE concept, this study proposes an industrial chain collaborative training model through the four-dimensional theoretical framework of the target chain, curriculum chain, practice chain, and evaluation chain, effectively responding to structural contradictions such as target orientation, industry-education collaboration, and quality evaluation in the training of part-time postgraduate students in local industry-specific institutions. It has achieved a shift in the training paradigm from "discipline-oriented" to "industry demand-oriented", providing a feasible solution to the predicament of industry-education integration constrained by the resource endowment of local institutions. The model, based on Hubei University of Automotive Technology, verified the scientific nature of deeply integrating industrial chain demands into the training system, provided a replicable reform path for similar institutions to optimize the training model of part-time postgraduate students and serve regional industrial upgrading, and had positive practical value for improving the lifelong education system and promoting the deep integration of industry and education.

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