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"Master Linkage": A Study on the Operational Mechanism Through Which Higher Vocational Skill Master Studios Enhance Teaching Quality

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Abstract: Driven by the Implementation Plan of National Vocational Education Reform, higher vocational education has entered a transformation stage from scale expansion to connotation-oriented development. As an important platform for promoting the integration of industry and education and improving teaching quality, higher vocational skill master studios take skill masters as the linkage to build connections between industry and teaching, masters and apprentices, as well as technologies and curricula. They constitute a key platform for advancing the connotation-driven development of modern vocational education. From four dimensions including curriculum updating, teacher training, practical teaching, and evaluation-feedback, this paper analyzes the operational mechanism whereby skill master studios improve teaching quality. It also puts forward four practical strategies: platform construction, curriculum optimization, team building, and institutional guarantee, so as to provide references for the establishment of skill master studios in higher vocational colleges.

Keywords: Skill master studio; Higher vocational education; Teaching quality; Operational mechanism; Integration of industry and education

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1. Introduction

At present, higher vocational colleges are generally confronted with problems such as curriculum contents failing to keep pace with industrial-technological updates in a timely manner, teachers' insufficient practical capabilities, and practical-training sites inconsistent with real enterprise production conditions. Skill master studios are educational-teaching organizations centering on functions including mentoring apprentices for skill inheritance, technological research-and-development, and cultural inheritance, and they are of great significance for cultivating vocational talents. Nevertheless, existing studies mostly focus on summarizing studio construction experience, lacking systematic elaboration on its internal mechanism for improving teaching quality. This paper puts forward the concept of the "Master Linkage," aiming to reveal the process

logic of how skill masters, acting as nodes, organically embed industrial resources, technical standards, and craftsmanship spirit into the teaching system, and further discusses studio construction strategies oriented toward teaching-quality improvement.

2. Operational mechanism of higher vocational skill master studios for promoting teaching quality improvement

2.1. Curriculum content updating mechanism: Dynamic transformation of industrial technologies into teaching contents

The disconnection between curriculum contents and industrial demands constitutes a major problem impairing higher-vocational teaching quality. The role of skill master studios in this link is to convert cutting-edge industrial technologies into teachable and learnable curriculum content. The studios adopt the "three-simultaneity" curriculum-updating approach to realize zero-time-lag docking between enterprise-technology iteration and teaching-content renewal, namely revising curriculum standards simultaneously with enterprise post standards, updating textbook contents simultaneously with real-project cases, and adjusting teaching modules simultaneously with technological iteration [1]. Here, the unique role of masters lies in that they are both technology owners and selectors-transformers of teaching content. With an accurate grasp of industrial-technology development trends, they can generalize scattered enterprise-technology information into systematic knowledge modules, thus effectively solving the problem that industrial information "can get in but cannot be taught."

2.2. Teacher competence improvement mechanism: Growth of "dual-qualified" teachers under master leadership

A common phenomenon among higher-vocational teachers is the "from-school-to-school" trajectory: they possess adequate theoretical-teaching competence yet lack hands-on enterprise experience. Skill master studios provide a structured approach to tackle this difficulty. From the operational perspective, the studios adopt modes including master-apprentice pairing, project guidance, task-driven implementation, and result-orientation. Enterprise skill masters can formulate personalized training plans for school teachers, who hone various competencies in real workshops by undertaking actual enterprise projects [2]. In practical terms, vocational colleges can build a dual-qualified teacher-training system relying on studios, supporting all teachers to obtain professional-skill certificates above the technician level. Furthermore, master's hands-on teaching can not only pass on technical expertise to students, but also help foster their "industrial thinking"—the awareness and capability of determining teaching priorities based on real enterprise requirements, which also serves as a core quality that dual-qualified teachers ought to possess [3].

2.3. Practical teaching transformation mechanism: Reconstruction of teaching scenarios driven by real-world projects

Higher-vocational practical teaching has long suffered from excessive simulation and insufficient hands-on practice. With the intervention of skill master studios, practical-teaching scenarios undergo qualitative changes. Studios introduce real enterprise production projects into teaching. Under masters' guidance, students directly participate in technical problem-solving and product-research-and-development, shifting from simulated training to hands-on practical engagement. Characterized by resolving the authenticity issue

of practical-training scenarios, this mechanism adopts the modes of "projects equal teaching" and "production equal learning," enabling students to automatically form comprehensive and structured professional competence when tackling real-world problems [4].

2.4. Evaluation feedback optimization mechanism: Closed-loop teaching quality with multi-subject participation

Traditional higher-vocational teaching evaluation is mostly conducted unilaterally by schools, with evaluation standards biased toward knowledge mastery while ignoring skill application. The establishment and application of skill master studios bring industrial standards and quality judgment into teaching evaluation. By constructing the "three-closed-loop" evaluation system, studios incorporate enterprise acceptance criteria, skill-competition standards, and vocational-skill-level standards into assessment. Evaluations are jointly conducted by masters, enterprise technicians, and school teachers, so that evaluation results feed back into teaching improvement [5]. The strength of this mechanism lies in breaking the closed-loop state of schools' "self-assessment and self-testing," forcing teaching-standard upgrading via industrial standards and forming an ongoing cycle of evaluation, feedback, and improvement.

3. Construction strategies for higher-vocational skill master studios oriented toward promoting teaching quality

3.1. Building the "school-enterprise dual-subject" collaborative platform and consolidating organizational foundations

The primary task of studio construction is to create a collaborative platform with in-depth school-enterprise participation, so as to resolve the dilemma of some studios that "only hang plaques" or "exist in name only."

First, at the organizational-structure level, a mechanism of "master leadership, enterprise priority, school support, team-based operation" shall be implemented to form diversified teams composed of enterprise skill masters, school teachers, and high-skilled enterprise personnel. The core of this structure is to clarify the division of responsibilities between schools and enterprises. Enterprises provide technical standards, real-world projects and master resources; schools deliver teaching transformation, site guarantee and daily management. Both sides define respective rights, interests, and responsibilities through signing cooperation agreements, preventing scenarios where schools are active while enterprises remain passive, or responsibility shirking [6].

Second, at the platform-function level, the single-function teaching positioning shall be broken through, and studios shall be built into comprehensive platforms integrating teaching, research-and-development, and services. In terms of teaching functions, it includes curriculum development and student cultivation; in terms of R&D functions, it covers technical tackling and process improvement; in terms of service functions, it comprises enterprise technical consultation and social training. A virtuous cycle exists among the three dimensions: R&D drives teaching, teaching boosts services, and services feed back into R&D [7]. Specifically, higher vocational colleges may build a collaborative system of "Famous-Teacher Studio—Skill-Master Studio—Key Laboratory." Among them, skill-master studios undertake the role of skill-inheritance chains, enabling teachers to improve their craftsmanship as well as comprehensive quality in practice, so as to realize all-round enhancement of four-dimensional capabilities: refined teaching, superb craftsmanship, research-and-development tackling, and service empowerment [8].

Finally, at the operational-mechanism level, regular communication-and-coordination systems shall be established. Both sides shall hold regular studio promotion meetings to jointly deliberate teaching plans, project arrangements, and talent-cultivation schemes. Meanwhile, posts for daily studio operations shall be set up for project docking, resource scheduling, process recording, and other tasks, ensuring orderly studio work [9]. In addition, cross-college and cross-regional platform linkage shall be emphasized to promote cooperation among studios of different majors, share master resources and enterprise channels, and amplify platform benefits.

3.2. Reconstructing curriculum systems aligned with industrial standards to realize dynamic adaptation

Curriculum construction constitutes a major approach for improving teaching quality, as well as an important arena for studios to exert their linkage function. Curriculum construction in higher vocational colleges shall follow the principle of "from industry, into teaching," and build systematic curriculum-reconstruction systems.

First, masters shall lead the reconstruction of core professional curricula and promote "post-com petence-deduction-oriented" redesign. Enterprise post requirements, skill-competition standards, and vocational-skill-level standards shall be integrated into curriculum standards [10]. In practice, masters can systematically sort out typical job-post contents and professional-competence requirements, decompose them into concrete curriculum modules, and arrange them in accordance with cognitive sequences and teaching orders. Ultimately, a teaching organizational structure starting from post-tasks and ending with professional-competence requirements can be formed.

Second, develop loose-leaf and project-oriented textbooks to realize dynamic adaptation between teaching contents and technological renewal. Loose-leaf textbooks feature replaceable modules and updatable contents. When enterprise technical standards change, only corresponding modules need replacement instead of rewriting the whole textbook. Project-oriented textbooks take real-world enterprise projects as carriers and embed knowledge acquisition into task-completion processes [11]. In this link, masters can make sound judgments on "which technologies can be incorporated into teaching, which projects possess teaching value, and which processes represent future development directions."

Third, build a dynamic curriculum-adjustment system. Curriculum contents shall be assessed and updated regularly in accordance with industrial-development trends and changes in enterprise employment demands. The adjustment mechanism consists of three tiers: the first tier is annual fine-tuning, modifying individual teaching modules based on feedback from masters and enterprises; the second tier is triennial intermediate adjustment, revising curriculum systems according to professional-talent-demand survey results; the third tier is quinquennial major overhaul, completely reshaping talent-cultivation programs based on industrial-upgrading demands. The key is to transfer the triggering right for curriculum updating to masters and their supporting information networks, so that curriculum systems maintain high sensitivity and rapid responses to industrial changes.

3.3. Forging the structured teaching team of "masters + teachers" and activating existing teacher resources

The construction of teaching teams lies at the heart of studio construction, and it represents the decisive factor for continuous teaching-quality improvement. Teaching-team construction shall highlight structurization and

practical-orientation, and accordingly build hierarchical and classified training systems.

First, in terms of team-building approaches, hierarchical cultivation shall be adhered to. Newly-recruited teachers enter studios in three phases: teaching assistant, research assistant, and project assistant. In the first year, they serve as teaching assistants, observing masters' teaching and project guidance; in the second year, as research assistants, participating in technical problem-solving and curriculum development; in the third year, as project assistants, undertaking partial enterprise projects and teaching tasks. Backbone teachers receive one-on-one guidance from masters to enhance their technical-tackling capabilities, with emphasis on their competence to solve complex technical problems and develop comprehensive teaching projects. Under masters' guidance, professional leaders coordinate curriculum development and technical-researc h-and-development work, forming a team structure of "masters leading orientations, leaders coordinating implementation, backbone teachers executing concrete tasks, and new teachers advancing in echelons" [12].

Second, in terms of competence-improvement approaches, real-world enterprise projects shall serve as foundations to guide teachers to enhance skills and accumulate experience in project tackling. This "learning-by-doing" mode proves more effective than simple training and further studies, because real-world projects feature task integrity, time constraints, and verifiable outcomes, which can comprehensively cultivate teachers' professional-technical competence, project-management capability, and teamwork skills [13]. For example, anchored on studios, schools can cooperate with enterprises and sister colleges to explore the innovative mode of "joint efforts by colleges-enterprises-colleges, inheritance-mentorship symbiosis, and joint-driven research-competition-innovation," making progressive arrangements ranging from new-teacher development to famous-teacher cultivation and pointing out directions for teacher growth.

3.4. Improving institutional safeguards and incentivizing mechanisms to guarantee long-term operation

Sustainable development of studios requires institutional support. The quality of institutional design directly determines whether studios can shift from "campaign-style construction" to "regular operation."

In terms of fund guarantees, schools shall build diversified investment systems combining fiscal appropriations, enterprise sponsorship, and achievement transformation, clarify the responsibilities of both schools and enterprises, and guarantee stable annual operating funds. Fiscal appropriations are mainly used for studio infrastructure construction and daily operations; enterprise sponsorship focuses on equipment renewal and project development; benefits from achievement transformation feed the sustainable development of studios.

In terms of assessment-system construction, schools shall build quantitative assessment systems covering institutional guarantee, teacher-team construction, talent cultivation, and industry-education integration, and conduct regular evaluations on studio operations [14]. Assessment indicators shall take both processes and results into account. Process indicators inspect studio-activity frequency, participant numbers, and project development status; result indicators are measured by improvements in students' skill levels, changes in the proportion of dual-qualified teachers, enterprise satisfaction, and quantity of transformed achievements.

In terms of incentive policies, schools shall incorporate studio-related work into teachers' professional-title evaluation and performance assessment, and offer preferences in salary-and-welfare treatment and honor recognition for staff participating in studio work. Teachers' project development, technical tackling, and apprentice-skill-inheritance work completed in skill-master studios shall be

converted into teaching workload or research-and-development achievements, which can serve as bases for professional-title evaluation. Honorary titles, appointment letters and selection as outstanding industrial instructors may be granted to enterprise technical experts and technicians to enhance their sense of belonging and pride [15]. In addition, a dynamic management system for master employment shall be established, clarifying appointment-period objectives and assessment indicators, and linking appointment-period evaluations with contract renewal, so as to create a sound ecosystem of "recruitment-dismissal mechanism and survival-of-the-fittest."

4. Conclusion

To sum up, the core logic for skill-master studios to boost teaching quality lies in taking "masters" as the linkage to break long-standing institutional and information barriers between industry and teaching. The four operational mechanisms revealed in this paper—curriculum updating, teacher-competence improvement, practical-teaching transformation, and evaluation-feedback—do not operate in isolation. Instead, they form a mutually-supportive organic whole via masters as the key nodes: industrial information enters teaching systems through curriculum updating; enhanced teacher competence guarantees effective implementation of new curricula; transformed practical-teaching provides real-world testing grounds for students' competence development; evaluation-feedback delivers continuous driving forces for teaching improvement. The theoretical significance of the "Master Linkage" concept is that it transcends the traditional perception of masters merely as "skill instructors" and reveals masters' unique value as "boundary spanners between educational systems and industrial systems." Future research may further focus on differentiated characteristics of operational mechanisms for skill-master studios in different types of higher vocational colleges and various professional fields, as well as how digital technologies empower cross-temporal-spatial collaboration of studios.

Disclosure statement

The authors declare no conflict of interest.

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