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Research on the Teaching Competence of Double-qualified Teachers in Vocational Colleges in the New Era

Yan Zhu

Liaoning Vocational Technical College of Modern Service, Shenyang, 110164, China

Abstract

This article aims to analyze in depth the connotation and structure, challenges and opportunities, and current development status of the teaching ability of double-qualified teachers in vocational colleges under the background of the new era. We will focus on building a structural model, evaluation index system, and guarantee mechanism for the teaching ability of double-qualified teachers in vocational colleges, and construct a highly operable and applicable teaching ability model for double-qualified teachers in vocational colleges. We will propose strategies and suggestions to enhance the teaching ability of double-qualified teachers, strengthen vocational education capabilities, and put forward research prospects.

Keywords

Teaching Competence, Double-qualified, Vocational Colleges.

1. Introduction

"Double-qualified" teachers are the key to the high-quality development of vocational education in the new era and an important manifestation of the core competitiveness of vocational colleges. The National Vocational Education Reform Implementation Plan issued by the State Council in 2019 pointed out that it is necessary to take multiple measures to build a team of "double-qualified" teachers, build a number of national vocational education teacher teaching innovation teams by major, further deepen the integration of industry and education and school-enterprise cooperation, and greatly improve the modernization level of vocational education in the new era. We should continue to promote the cultivation of a high-quality team of "double-qualified" teachers as a fundamental task. With the development of the social economy and the transformation and upgrading of industries, it is a major mission of vocational colleges to cultivate high-quality and competitive technical and skilled talents needed by society. It is necessary to build a team of "double-qualified" teachers that meets the needs of modern social development and the high-quality development of vocational education. The integration of industry and education, as an important part of vocational education, is developing rapidly. It is an important bridge connecting the education chain and the industrial chain and an important support for the growth of "double-qualified" teachers.

2. Research Objectives and Questions

2.1. Clarify the Connotation and Structure of the Teaching Competence of "Double-Qualified" Teachers

The theory of "double-qualified" teachers was proposed in the 1980s and applied to the teaching of vocational colleges. The professional positioning of "double-qualified" teachers in the vocational education field in China has gone through a continuously deepening cognitive process. The academic community generally agrees that its core characteristic lies in the binary ability structure of theoretical teaching and practical guidance. Many scholars define "double-qualified" as "the dual certification of teacher qualifications and technician qualifications",

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which reflects the path dependence on vocational qualification certification in traditional cognition.

In the context of current industrial transformation and upgrading, the connotation of "double-qualified" teachers is undergoing a structural leap. Vocational education is developing towards the integration of industry and education, and enterprises are developing towards digitalization and intelligence. Vocational colleges need to closely combine school teaching content with modern industrial development according to the requirements of modern technology development for students' abilities. The Research on the Teacher Competence Framework from the Perspective of the Modern Vocational Education System released by the Vocational and Technical Education Center Institute of the Ministry of Education in 2022 clearly pointed out that the "Three-Ability" characteristic system in the new era includes theoretical teaching ability, practical operation ability, and the ability to integrate industry and education.

2.2. Analyze the Challenges and Opportunities for the Development of the Teaching Competence of "Double-Qualified" Teachers in the New Era

The identification standards of various vocational colleges vary, which largely hinders the construction and development of the "double-qualified" teacher team. Due to the lack of unified standards, there are also different opinions on the specific concept of "double-qualified" teachers[1]. Some vocational colleges believe that "double-qualified" teachers refer to those with double certificates, which are reflected by certificates. They value both teachers' teaching abilities and practical abilities. This also leads to the situation that some teachers with the abilities of "double-qualified" teachers find it difficult to obtain certificates due to various reasons and thus cannot pass the identification of "double-qualified" teachers. Some vocational colleges believe that "double-qualified" teachers should have double qualities, emphasizing both teachers' professional ethics and practical skills. However, there are different requirements for how long teachers need to have enterprise practice experience, what kind of enterprise practice results they should have, and how to reflect these results. Some vocational colleges believe that "double-qualified" teachers should have both double certificates and double qualities and double professional titles. Some other vocational colleges believe that different standards should be adopted for "double-qualified" teachers according to different majors and positions. At present, due to different development stages and goals, it is difficult to unify the identification standards of "double-qualified" teachers among schools. This leads to the inability of vocational colleges and enterprises to reach an agreement on their respective focuses during cooperation, thus failing to meet the actual needs of practical teaching, and the training effectiveness of the "double-qualified" teacher team is not significant.

2.3. The Training System for "Double-Qualified" Teachers Needs to Be Improved

With the continuous deepening of vocational education reform and the continuous expansion of the scale of vocational colleges, the training system for "double-qualified" teachers has gradually been established and improved. However, there are still some problems that need to be continuously improved. First, school-enterprise cooperation is not deep enough, and the training effectiveness is not obvious. Due to the different interests of the two parties in school-enterprise cooperation, vocational colleges lack stable training bases for "double-qualified" teachers. The participation of industries and enterprises in the training of "double-qualified" teachers is not high, and they fail to provide enough positions for teachers to practice. School-enterprise cooperation is relatively superficial. Second, the enterprise practice system for teachers is not perfect. At present, the teaching tasks of teachers in vocational colleges are relatively heavy. Generally, they can only carry out enterprise practice during winter and summer vacations. However, due to limited practice time and relatively single work content, many teachers can only have a cursory look and fail to fully learn and solve technical problems

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in the production process. At the same time, there is also a phenomenon that some teachers carry out enterprise practice in a perfunctory manner, with unclear goals, and it is difficult for them to get involved in the key areas and key technologies of enterprise work, resulting in difficulty in improving their practical technical level. Finally, the assessment method is not clear. There is no practical post skill assessment or the skill assessment is just a formality, which is of little help to the improvement of teachers' skills. Most of them focus on written summaries and experience reports, which have little effect on the improvement of teachers' professional levels, practical skills, and professional qualities, resulting in teachers' lack of enthusiasm for post practice.

2.4. The Incentive Mechanism for "Double-Qualified" Teachers Has Not Been Sound

The incentive mechanism is an important institutional guarantee for the cultivation of "double-qualified" teachers and a necessary condition for the stable and sustainable development of "double-qualified" teachers in vocational colleges. At present, vocational colleges have not formed an operable plan for the incentive mechanism in the training of "double-qualified" teachers. First, there is no advantage in the salary and treatment between teachers who have passed the identification of "double-qualified" teachers and non - "double-qualified" teachers. Moreover, the identification, development, and training of "double-qualified" teachers have not been included in the assessment items such as teachers' post salaries, performance distribution, professional title promotion, post competition, and selection of excellent teachers. As a result, some teachers are unclear about the promotion channels after being identified as "double-qualified" teachers, which cannot improve teachers' enthusiasm. Second, the spiritual incentive for "double-qualified" teachers is particularly lacking. In vocational colleges, there are no special commendation and reward items for "double-qualified" teachers. The award - setting for ordinary teachers can better stimulate their sense of achievement, such as "Excellent Teacher", "Model Teacher", "Educator Model", etc. However, there are no corresponding honorary titles for "double-qualified" teachers, which also greatly reduces the sense of honor of "double-qualified" teachers themselves and greatly reduces the enthusiasm of other teachers to join the "double-qualified" teacher team[2].

2.5. Put Forward Strategic Suggestions for Improving the Teaching Competence of "Double-Qualified" Teachers

Innovate the channels for talent introduction and optimize the structure of the "double-qualified" teacher team. At present, the phenomenon of "emphasizing academic qualifications" in the expansion and cultivation of the "double-qualified" teacher team in vocational colleges is relatively common. Most of them require high - academic - qualification talents. In the recruitment process, candidates are first screened according to academic qualification conditions. Those without a master's or even a doctor's degree basically have no chance. Little consideration is given to undergraduates or senior technicians with rich enterprise practice experience and outstanding skills. Since 2020, the recruitment of professional teachers in vocational colleges has basically stopped recruiting fresh graduates. Therefore, vocational colleges should innovate the recruitment method. In the recruitment process, in addition to requirements for candidates' academic qualifications, more attention should be paid to their professional skills or enterprise work experience. For high - level and skilled talents, direct investigation and public recruitment can be carried out. Broaden the recruitment channels. For candidates with rich enterprise work experience and strong practical abilities, the access standards can be appropriately reduced, and opportunities for learning and improvement after entry can be provided. Teachers should be regularly selected to study and visit, and their professional abilities should be continuously improved. At the same time, through deepening the integration of industry and education, on the one hand, high - skilled talents such as master

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craftsmen, skilled masters, and inheritors of intangible cultural heritage in industries and enterprises can be attracted and employed to expand the teaching staff. On the other hand, outstanding alumni who have entered enterprises can be selected. They come from the school, grow in the enterprise, and then return to the school, which can better show their value in the teaching position. Resources are shared between the classroom and the workshop, and collaborative education is carried out.

2.6. Establish an Industry-Education Integration Mechanism

Whether it is "double-skill type", "double-certificate type", or "double-quality type", it emphasizes the combination of teachers' solid theoretical knowledge and excellent practical skills. Therefore, the identification standards for "double-qualified" teachers should be jointly developed by schools and enterprises, and an industry-education integration mechanism should be established. The emergence of "double-qualified" teachers emphasizes that teachers should not only have theoretical knowledge as the cornerstone but also practical skills as the bridge. They should not only be able to "teach" on the podium but also be able to "do" off the podium. They must have the ability to connect with industries and enterprises and meet the needs of practical teaching. Through the above three aspects, schools and enterprises work together, and multiple subjects participate to build the identification standards for "double-qualified" teachers[3].

2.7. Build a School-Enterprise Cooperation Platform

Highlight the characteristics of the cultivation of vocational education teachers, emphasize the effect of enterprise practice, and conduct quantitative assessment. There should be quantifiable indicators for the effectiveness of teachers' learning in enterprises. Second, enterprises enter the campus. A regular communication and learning mechanism for school-enterprise cooperation should be established. Projects such as "Master Workshops" and "Model Workers Entering the Campus" should be carried out. Master craftsmen should be hired as in - school training mentors. Through practical project training and learning, the practical level of professional teachers can be improved. At the same time, academic lectures and skill competitions can be regularly held for mutual sharing and communication. In various teacher skill competitions, enterprise experts can be invited to form teams to participate, learn from each other's strengths, and make common progress. Finally, establish a school-enterprise cooperation department and build a school-enterprise cooperation platform. First, it is convenient for schools and enterprises to communicate and better carry out project research, giving play to the synergy of school-enterprise cooperation and helping to cultivate a high - quality "double-qualified" teacher team. Second, through the school-enterprise cooperation department, there is a communication platform for both sides[4]. Enterprise mentors and school teachers can communicate with each other. For issues such as teacher training, curriculum development, post practice, and skill improvement, they can jointly discuss and determine the optimal plan in a timely manner.

3. Definition of Core Concepts

"Double-qualified" teachers are a special professional group in the Chinese - characteristic vocational education system. Their definition has undergone a paradigm shift from "double-certificate superposition" to "ability integration". According to the National Vocational Education Reform Implementation Plan (2019), its standard definition is:"A compound teacher who has the ability of education and teaching and professional technical practice, and can transform industrial technical standards into teaching standards and realize the connection between the teaching process and the production process."This concept contains three dimensions.

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(1) Composite Qualifications

Teachers need to hold both a teacher qualification certificate and a vocational qualification certificate (or vocational skill level certificate) at the same time.

(2) Integrated Abilities

The dynamic integration of theoretical teaching and practical guidance abilities in the curriculum implementation process.

(3) Dual Roles

Teachers are not only school teachers but also enterprise

technical consultants or engineers.

4. Analysis of Typical Characteristics

4.1. Design of the Coupling Mechanism

4.1.1. Theoretical and Practical Transformation Model

Construct a three - stage model of "knowledge deconstruction - situation reconstruction - ability internalization". Relying on the post - ability standard library jointly built by schools and enterprises (such as the Huawei ICT Academy certification system), the dynamic matching between teaching content and industry technical standards can be realized.

4.1.2. Two - Way Feedback System

Establish a closed loop of "enterprise technology update → curriculum module iteration → teaching effect evaluation → enterprise talent feedback". Real - time data interaction can be achieved through the intelligent teaching platform (such as the New Channel Technology VBSE system).

4.2. Core Implementation Paths

4.2.1. Curriculum Reconstruction

Develop a trinity curriculum package of "theoretical micro - courses + virtual simulation + workshop practical operation". Referring to the vocational standard development process of the Ministry of Education, the docking rate between the curriculum and the X - certificate standard is $\geqslant$85%.

4.2.2. Field Innovation

Create an "integrated theory and practice" teaching space, integrate AR/VR technology (such as the intelligent warehousing simulation training of JD Logistics), and implement a progressive teaching model of "classroom work order → workshop work position → innovation workshop".

4.3. Examples of Typical Models

Take Shenzhen Polytechnic as an example:

(1) Double-Qualified Teacher Competence Standards

Teachers participate in at least 1 enterprise project per year on average, and the annual update rate of teaching cases is 30%.

(2) Digital Empowerment System

Build an intelligent diagnosis platform to collect and analyze training data in real - time (the equipment utilization rate has increased by 40%).

(3) Evaluation Reform

Implement a three - dimensional assessment of "school assessment + enterprise evaluation + skill competition". The employment rate of graduates in their major - related fields reaches 93%.

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4.4. Guarantee Mechanisms

4.4.1. Institutional Innovation

Implement the enterprise practice credit bank system for teachers. It is required that full - time teachers have a cumulative enterprise practice of at least 6 months in 5 years (referring to Article 45 of the Vocational Education Law).

4.4.2. Resource Support

Build an industry-education integration training base (the per - student equipment value is ≥25,000 yuan), and jointly build "double - qualified teacher workshops" by schools and enterprises (such as the BYD New Energy Vehicle Technology Center).

5. Dual-Identity of School-Enterprise

5.1. Connotation and Value of the Dual-Identity

5.1.1. Deconstruction of Identity Traits

(1) Dual professional roles: The combination of the identities of teacher (teaching implementer) and engineer (technical practitioner).

(2) Dual field spaces: The integration of the school (knowledge field) and the enterprise (production field) scenarios.

(3) Dual ability standards: The dual certification of teaching ability (teaching competition indicators) and technical ability (enterprise job - rank system).

5.1.2. Analysis of Synergistic Effects (Citing the Policy Basis of the National Vocational Education Reform Implementation Plan)

(1) Teaching supply - side reform: In the past three years, 72.3% of enterprise technical standards have been transformed into teaching standards (according to the 2023 Higher Vocational Quality Annual Report).

(2) Technology feedback mechanism: The number of teachers participating in enterprise technological transformation projects has increased by 25% annually on average (data from Guangdong Industry Polytechnic).

(3) Talent cultivation value - added: The starting salary of students in classes taught by double - qualified teachers is 18.6% higher than the average value (tracking data from Shenzhen Polytechnic).

5.1.3. Three - Dimensional Model of Dual-Identity Abilities

(1) Teaching ability axis

(a) Modular curriculum design (such as developing a "1 + X" certificate - curriculum integration curriculum package).

(b) Productive project - based teaching (the conversion rate of real - enterprise projects is ≥60%).

(2) Technical ability axis

(a)Industry technical sensitivity (obtaining enterprise certifications such as Huawei HCIE).

(b)Engineering practice innovation ability (participating in at least 1 enterprise R & D project per year on average).

(3) Cross - border management axis

(a) Integration of school - enterprise resources (forming cross - organizational teaching teams).

(b) Dual - scene switching ability (strategies for switching between enterprise workshops and classrooms).

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5.1.4. Realization Paths of the Dual-Identity

(1) Institutional Innovation

(a) Two-way Employment System: Implement the "school establishment + enterprise position" dual employment system (such as in TCL Intelligent Manufacturing Academy).

(b) Flexible Working System: Set up an enterprise practice semester (with 4 - week concentrated on - site work in the enterprise each academic year).

(2) Resource Integration

(a) TDual-tutor Workstations: Jointly build a technology R & D center by schools and enterprises (with the per - student equipment value ≥ 35,000 yuan).

(b) Project Resource Pool: Build a real - enterprise project case library (updated with ≥ 50 cases per school per year).

(3) Evaluation Reform

(a) Dual-track Assessment System: Teaching performance (40%) + Technical achievements (40%) + Cross - border contributions (20%).

(b) Third - party Certification: Introduce industry associations to conduct ability assessments (such as the Tencent Cloud Certified Instructor System).

5.1.5. Realization Paths of the Dual-Identity

Typical Practice Model (Taking Shenzhen Polytechnic as an Example)

Table 1. Typical Practice Model

Dimension	Implementation Strategy	Implementation Effect
Identity Certification	Implement the "teacher/engineer" dual - title review	78% of professional teachers have obtained enterprise technical titles
Project Carrier	Jointly build BYD Industrial College	Developed 32 new energy vehicle training projects
Assessment and Incentive	Convert enterprise practice into teaching workload (1:1.2)	Teachers' average annual enterprise practice reaches 58 days
Achievement Transformation	Establish a special fund for "technology feeding back teaching"	The proportion of teaching cases sourced from enterprises has increased to 67%

5.1.6. Key Support Systems

(1) Policy Guarantee: Implement the two-way personnel flow system between schools and enterprises as stipulated in Article 46 of the Vocational Education Law.

(2) Digital Empowerment: Build a growth archive platform for dual-qualified teachers (recording the dual tracks of teaching and technology).

(3) Cultural Integration: Establish a normalized mechanism for mutual secondment of school and enterprise personnel (with an annual rotation of at least 20 people).

The majors offered by schools should be closely integrated with modern economic industries, relying on and promoting each other[5]. Schools should jointly develop professional talent training plans with enterprises. The development of majors should adapt to the development of enterprises. Scientific research and technical services should be integrated to form a school-running model that closely links schools and enterprises, enabling students to combine theoretical learning with vocational training from the moment they enter school. The

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integration of industry and education mainly includes the following three aspects: First, the integration of modern industries and vocational education. Modern industries mainly provide practical and guiding support for vocational college education, while vocational college education provides talent service support for modern industries. They cooperate with each other and achieve mutual success. Second, the integration of modern enterprises and vocational colleges. Enterprises need talents, and schools cultivate them. The two sides match and cooperate with each other, sharing resources and achieving mutual benefit and win-win results. Third, the integration of actual work positions and classroom teaching. Enterprise work positions are the destination for the realization of personal value by the talents cultivated by schools. It is necessary to be practical and, based on the requirements of positions, connect the teaching process with the production process, promote production through teaching and vice versa, and promote the high-quality development of vocational education[6].

5.1.7. Dual Qualification Certification System

Table 2. Access Standards

Certificate Type	Teaching - related	Technical - related
Basic requirements	University Teacher Qualification Certificate |	Vocational Qualification Certificate at the Senior Worker level or above
Upgrade requirements	1 + X Certificate Trainer Qualification	Engineer / Technician Professional Title

6. Dynamic Update Mechanism

6.1. Realistic Logic of Dynamic Update

6.1.1. Technology Iteration Forcing Mechanism

The average annual update rate of technical standards in the intelligent manufacturing field reaches 23% (as stated in the "2023 Manufacturing Talent White Paper" released by the Ministry of Industry and Information Technology).

The adjustment cycle of the higher vocational specialty catalog has been shortened to 2 years (compared with the 5-year cycle of the 2015 version).

6.1.2. Requirements of Education Supply - side Reform

The average lag period for the transformation of new enterprise technologies into teaching resources has been shortened from 18 months to 6 months (taking the case of Shenzhen Polytechnic).

The matching degree between teachers' teaching ability standards and industry job requirements has increased by 27% (data from the 2022 Higher Vocational Quality Annual Report).

6.1.3. Three - Dimensional Linkage Model

The 3D linkage model is shown in Figure 1.

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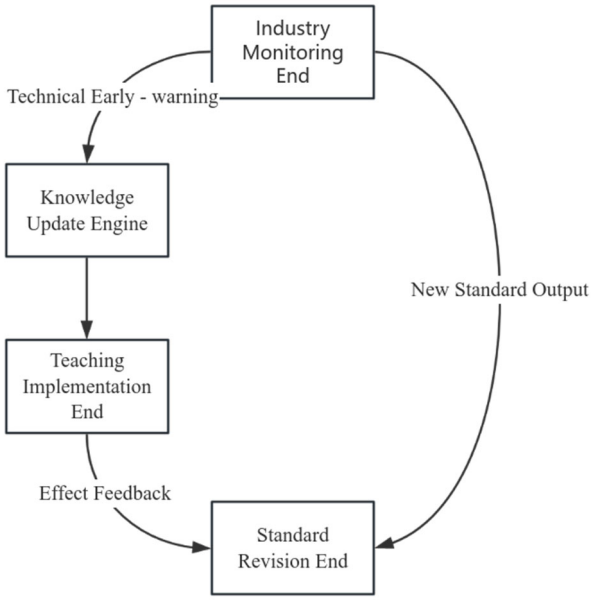

Figure 1. 3D linkage model

6.1.4. Front - end Monitoring System

(1) Build a "technology radar station" with school - enterprise linkage (such as the Huawei 5G Technology Monitoring Center).

(2) Establish an annual release system for the "New Industry Technology List".

6.1.5. Middle - end Transformation System

(1) Develop an intelligent transformation platform from "technology package → curriculum package" (integrating knowledge graph technology).

(2) Establish a dynamic replacement mechanism for modular courses (updating at least 15% of the teaching content each semester).

6.1.6. Back - end Feedback System

(1) Conduct tracking of graduates' job fitness (establish a 3 - year career development file).

(2) Construct a two - way calibration index system for "teaching standards - industry standards".

6.1.7. Implementation Paths of Dynamic Update

(1) Teacher Competence Iteration Mechanism

Hierarchical training system:

(a) Basic Level: 40 - hour annual training on new technologies (with micro - certificate certification).

(b) Improvement Level: Participate in enterprise technical research projects (at least 1 project per year on average) [7,8].

(c) Leading Level: Form cross - school - enterprise technology innovation teams (such as the TCL Industrial Internet R & D Group).

(2) Curriculum Content Update Mechanism

Implement the "Three - Step Update Method" as shown in Figure 2.

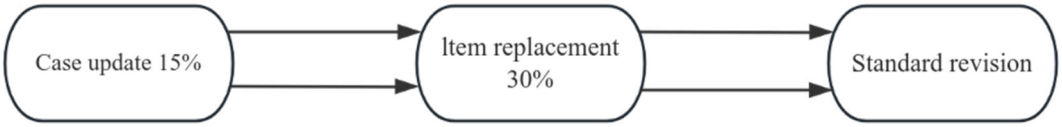

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Figure 2. Three - step update method

(3) Evaluation Standard Evolution Mechanism

Introduce the "Ability Growth Degree" assessment model:

Table 3. Ability Growth Degree

Dimension	Benchmark Indicators	Dynamic Indicators
Technical Ability	Enterprise Certification	Speed of Mastering New Technologies (months/item)
Teaching Ability	Awards in Teaching Competitions	Curriculum Update Contribution Value (points/semester)
Cross - border Ability	School - enterprise Cooperation Projects	Resource Conversion Efficiency (cases/year)

6.1.8. Typical Operation Model (Taking Wuxi Institute of Technology as an Example)

The "Four - Dimensional Gear" Driving Model:

(1) Technology Gear: Align with Schneider Electric's technology roadmap (quarterly technology docking meetings).

(2) Teaching Gear: Develop a modular curriculum toolbox (update 40 practical training projects annually).

(3) Teacher Gear: Implement the three - level advancement plan of "Young Talent - Backbone - Master".

(4) Evaluation Gear: Introduce the enterprise KPI assessment method (with a technical response time limit of ≤ 72 hours).

7. Research Conclusions and Prospects

7.1. Conclusions

7.1.1. Reconstruction of the Competence Model

A three - dimensional coupling model of "teaching competence - technical competence - cross - border competence" is proposed, breaking through the single - dimension teaching evaluation of traditional teacher competence. An ability evaluation radar chart with vocational education characteristics is formed, covering 5 core indicators and 12 observation points.

7.1.2. Breakthrough in Mechanism Design

A spiral update mechanism of "dynamic monitoring → intelligent transformation → two - way calibration" is constructed. The cycle of transforming industry technical standards into teaching content is shortened to 3 - 6 months, which is a 400% efficiency improvement compared with the traditional model.

7.1.3. Value of Institutional Innovation

A school - enterprise dual - track assessment system is designed (teaching achievements account for 40%, technical achievements account for 40%, and cross - border contributions account for 20%). This system breaks the long - standing problem of "emphasizing papers over practice" in teacher evaluation. In pilot institutions, the participation rate of teachers in enterprise practice has increased from 32% to 78%.

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7.2. Research Deficiencies and Prospects

7.2.1. Research on Digital Transformation

(1) Explore new paths for artificial intelligence to empower the development of dual - qualified teachers' abilities:

Construction of teacher digital twin systems.

(2) Cultivation of blended teaching abilities in the meta - universe scenario.

(3) Technology for dynamically profiling teachers' abilities based on big data.

7.2.2. Room for Institutional Breakthroughs

(1) Resolve the legal conflict between public institution staffing and enterprise part - time jobs (supported by the implementation rules of the Vocational Education Law).

(2) Establish a dual - qualified teacher certification system under the national qualification framework (aligned with international standards such as Germany's IHK).

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