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Practical Pathways for Professional Development and Competency Enhancement of Vocational Education Teachers

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Abstract: As vocational education increasingly plays a vital role in national talent cultivation, the professional development and competency enhancement of vocational education teachers have become key factors in promoting high-quality vocational education. This study aims to explore effective practical pathways for the professional growth and competency improvement of vocational education teachers. By systematically reviewing relevant research both domestically and internationally, and employing literature research and theoretical analysis methods, the study delves into the current challenges and dilemmas faced by vocational education teachers in light of development trends and professional needs. Findings indicate significant shortfalls in teaching competencies, practical skills, innovative capacities, and adaptability to technological changes. Additionally, factors such as an inadequate training system and lack of incentive mechanisms constrain development. Consequently, the study proposes practical pathways from multiple dimensions: reinforcing policy guidance and improving institutional support for teacher development; establishing a multi-tiered, diversified training system to enhance overall teacher competencies; leveraging new technologies like artificial intelligence and digital tools to empower teaching and research; creating a scientifically sound incentive mechanism to stimulate intrinsic motivation for teacher development; and promoting a lifelong learning ethos among teachers to facilitate self-directed professional growth. The conclusions offer theoretical insights and practical guidance for the professional development and competency enhancement of vocational education teachers, contributing to the overall improvement of vocational education faculty and teaching quality.

Keywords: Vocational Education; Teacher Professional Development; Competency Enhancement; Practical Pathways; Faculty Development

1. Introduction

1.1 Research Background and Significance

In the context of the flourishing development of new productive forces, vocational education, as the type of education most closely linked to economic and social development, carries the crucial mission of supplying high-quality technical and skilled talent for industrial upgrades [6]. The "White Paper on the Development of Vocational Education in China (2024)" indicates that vocational colleges in China have cumulatively produced over 300 million technical and skilled workers, playing an irreplaceable role in supporting the transformation and upgrading of the manufacturing sector and promoting rural revitalization. However, the core of high-quality development in vocational education lies in the construction of the teaching workforce. Data from a Ministry of Education survey in 2025 shows that the proportion of "dual-qualified" teachers in vocational colleges is only 43%, significantly lower than the over 70% seen in developed countries like Germany and Switzerland. The mismatch between the professional capabilities of the teaching staff and the evolving industrial technologies has become a bottleneck restricting the quality enhancement of vocational education.

From the perspective of societal needs, the widespread application of new technologies such as artificial intelligence and big data is accelerating the transformation of industrial structures towards intelligence and high-end development, leading to an explosive growth in demand for composite technical and skilled talents. In this context, vocational education teachers not only need solid theoretical teaching abilities but must also master cutting-edge

industry technologies and practical skills to cultivate high-quality talents that meet industrial demands. Researching the professional development and capability enhancement of vocational education teachers is of significant practical importance for improving the adaptability of vocational education, promoting deep integration of industry and education, and serving national strategic needs.

1.2 Review of Domestic and International Research Status

Internationally, research on the professional development of vocational education teachers began earlier, forming a relatively complete theoretical system. In Germany's "dual system" vocational education model, the emphasis is placed on teachers possessing both practical industry experience and teaching abilities, supported by strict entry standards and regular training to ensure professional development; Australia has established a teacher training framework centered on competency-based education, focusing on the synergistic improvement of teachers' practical capabilities and professional qualities. In recent years, with the advancement of digital technologies, countries such as the United States and the United Kingdom have begun exploring the application of virtual simulation and artificial intelligence in teacher professional development, providing personalized learning support for educators.

In China, scholars have conducted multidimensional discussions on the professional development of vocational education teachers. Cai Ming and Sun Zhiquan (2025) explored the practical paths for empowering vocational education with artificial intelligence, providing a technological perspective for enhancing teacher capabilities [1]; Huang Shufang (2025) studied training pathways for "dual-qualified" teachers, proposing the construction of a diversified and collaborative training system [2]; Luo Li and Wang Zhongli (2025) emphasized leading teacher development with an educator spirit, highlighting the value orientation of professional development [5]. However, existing research often focuses on singular dimensions, lacking systematic studies that synergistically promote teacher professional development through policies, technologies, and training, and discussions on practical paths for teacher capability transformation in the context of the new technological revolution remain weak.

1.3 Research Objectives and Methods

This study aims to construct a scientific, systematic, and operational framework for the professional development and capability enhancement of vocational education teachers, addressing the capability shortfalls and developmental dilemmas currently faced by the teaching workforce. The research employs a literature review method to summarize theoretical and practical achievements in the professional development of vocational education teachers both domestically and internationally. It utilizes case analysis to dissect successful experiences in enhancing teacher capabilities at typical vocational colleges, and combines surveys and interviews to obtain first-hand data on the current state of teacher development in vocational institutions. Through this multi-method integration, the study aims to ensure the scientific rigor and practical guidance of its conclusions.

2. Theoretical Foundation of Professional Development and Capability Enhancement of Vocational Education Teachers

2.1 Definition of Relevant Concepts

Professional development of vocational education teachers refers to the process through which educators enhance their teaching competencies, professional knowledge, and career qualities through continuous learning, reflective practice, and professional support throughout their careers. Its core lies in adapting to the characteristics of vocational education and forming a professional profile that encompasses theoretical instruction, practical guidance, and integration of industry and education. "Dual-qualified" teachers, as the core of the vocational education workforce, must possess both solid theoretical teaching abilities and rich industry experience, enabling them to deeply integrate industrial technology with educational content [2].

Capability enhancement emphasizes the dynamic development of teachers in areas such as teaching skills, technology application, curriculum development, and research innovation. Especially in the context of the new technological revolution, it requires teachers to have digital teaching capabilities,

interdisciplinary integration skills, and lifelong learning abilities to respond to challenges posed by industrial transformation.

2.2 Theoretical Support System

The theoretical foundation for the professional development and capability enhancement of vocational education teachers spans multiple academic fields. From an educational perspective, teacher professional development theory emphasizes the continuous growth of educators as professionals, including the construction of professional knowledge, reflective teaching practices, and the formation of professional identity. From a sociological perspective, teacher role theory suggests that vocational education teachers must assume multiple roles, including knowledge transmitters, skill guides, and industry participants, with their professional development influenced by social environments and industry demands. Additionally, human capital theory posits that teachers, as vital educational resources, can enhance educational quality and promote socio-economic development through capability enhancement, providing a theoretical basis for policy support and resource investment in teacher professional development.

3. Analysis of the Current Status of Professional Development and Capability Enhancement of Vocational Education Teachers

3.1 Current Development Status of Vocational Education Teachers

Currently, the size of China's vocational education teacher workforce continues to grow. According to data from the Ministry of Education, by the end of 2024, there were 1.265 million full-time teachers in vocational colleges, an increase of 18.7% compared to five years ago. However, significant issues still exist in teacher structure: over 60% of teachers hold a bachelor's degree or lower, while only 28.3% possess a master's degree or higher; regarding professional titles, less than 5% of teachers hold senior titles, with 42% holding junior titles. Although the number of "dual-qualified" teachers has increased, many lack sufficient industry practice experience, resulting in a gap between practical skills and industry advancements.

In terms of age distribution, young teachers account for over 50%, characterized by high enthusiasm and creativity, but generally lack industry practice experience and teaching practice accumulation. Conversely, while senior teachers possess rich teaching experience, they face difficulties in adapting to new technology applications and curriculum reforms, leading to a developmental trend of "disconnection between the young and the old" within the teaching workforce.

3.2 Existing Problems in Teacher Professional Development and Capability Enhancement

In terms of teaching abilities, some teachers continue to rely on traditional teaching methods and fail to effectively utilize project-based or situational teaching, which are characteristics of vocational education, resulting in a disconnect between teaching and industry needs. Regarding practical skills, vocational college teachers spend less than 30 days annually in industry practice, making it challenging to grasp new technologies and processes, which negatively impacts the quality of practical teaching [9]. Additionally, participation rates of teachers in enterprise technology research and product upgrades are low, and the development of courses and teaching resources lags behind industrial advancements. Furthermore, weak digital teaching capabilities are also prevalent; surveys indicate that only 32% of teachers can proficiently use technologies such as virtual simulation and artificial intelligence for teaching [1].

4. Factors Influencing the Professional Development and Capacity Enhancement of Vocational Education Teachers

4.1 Policy and Institutional Factors

The existing policy framework for the professional development of vocational education teachers is inadequate. Current teacher entry standards emphasize low practical competence, and there is a noticeable bias in professional title evaluations that favors publications over practical experience. For instance, in one province, the criteria for senior title application require the publication of three papers in core journals, while the quantification of industry practice outcomes remains vague. Moreover, teacher training, assessment, and incentive mechanisms lack systemic organization, with some regions investing only 65% of the training budget compared to general

education, which fails to meet professional development needs.

4.2 Training System Factors

The present training for vocational education teachers suffers from a lack of diversity in format and outdated content. Most training focuses on theoretical lectures, neglecting practical operations and on-site industry training, leading to a mismatch between training content and actual teacher needs. A survey of 100 vocational schools revealed that 78% of teachers believe training does not address practical teaching issues. Additionally, training resources are fragmented, and the lack of a robust school-enterprise collaboration mechanism limits teachers' exposure to cutting-edge technologies and real production environments.

4.3 Technological Environment Factors

The rapid development of new technologies such as artificial intelligence and big data presents both opportunities and challenges for vocational education teachers' capacity enhancement. While technologies like virtual simulations and intelligent teaching platforms can enrich teaching methods, teachers face challenges such as inadequate technical application skills and the need to improve digital literacy. Research indicates that only 25% of vocational teachers can independently develop digital teaching resources, and 60% report a lack of technical training. Furthermore, the fast-paced technological changes require continuous learning, placing higher demands on teachers' learning capabilities and availability.

4.4 Teacher-Related Factors

Some teachers underestimate the importance of professional development, showing a tendency to prioritize teaching tasks over skill enhancement, which hinders proactive learning and self-improvement. The heavy workload in vocational institutions, averaging 16-20 class hours per week coupled with student management and competition guidance, limits the time available for professional learning and research. Additionally, widespread professional burnout, especially among those engaged in repetitive teaching, reduces their drive for innovation and personal growth.

5. Policy Support Pathways for the Professional Development and Capacity Enhancement of Vocational Education Teachers

5.1 Improvement of the Teacher Development System

The completeness of the teacher development system directly influences professional growth. Current entry standards for vocational education teachers lack clarity regarding practical skills; some regions only consider academic qualifications and teaching certificates, overlooking practical industry experience and skill levels. To enhance the system, it is necessary to establish clear "dual-qualified" teacher entry standards, requiring professional instructors to have at least two years of relevant industry experience or higher-level vocational skill certificates.

Regarding title evaluation systems, there is a need to shift from a publication-heavy focus to include practical contributions such as industry service outcomes, course development, and mentorship for student competitions, similar to practices in Germany. A pilot reform in one province increased the weight of practical achievements to 40% in title evaluations, encouraging teachers' active engagement in industry projects and practical teaching reforms. Additionally, a professional development portfolio system should be established to record teachers' training, industry experience, and research outcomes, providing a basis for dynamic evaluation and targeted support.

5.2 Strengthening Policy Guidance and Resource Support

Policy guidance is crucial for promoting teacher professional development. Governments need to issue specific policies that encourage vocational schools and enterprises to co-establish teacher development centers, clarifying enterprises' responsibilities and rights in teacher training. For example, the "Regulations on Promoting Integration of Industry and Education" could specify tax incentives and recognition for enterprises involved in teacher training. In terms of resource support, financial investment should be increased, raising the proportion of specialized funds for vocational education teacher training. Data from the Ministry of Education indicates that the average training budget per vocational teacher in 2024 is 850 Yuan, which could be increased to 1200 Yuan within three years to support teacher practical

training and new technology initiatives.

Furthermore, a professional development fund should be established to reward teachers excelling in teaching reform and technological innovation while supporting their participation in domestic and international academic exchanges and high-level training projects to broaden their professional horizons.

6. Optimizing Training Pathways for the Professional Development and Capacity Enhancement of Vocational Education Teachers

6.1 Establishing a Tiered Training Model

The vocational education teacher community is diverse in age, title, and professional field, necessitating a tiered training model. For young teachers, a dual-track training program focusing on "basic teaching skills + industry practice" should be implemented to help them master vocational teaching methods and accumulate industry experience. For experienced teachers, participation in advanced technology workshops and international vocational education exchange programs should be organized to enhance course development and teaching innovation capabilities. Professional leaders should focus on cutting-edge industry technologies and professional group development to cultivate their leadership in professional growth.

For instance, a national-level teacher innovation team is divided into curriculum development, practical teaching, and information technology groups, each receiving specialized training, leading to significant improvements in overall teaching quality.

6.2 Integrating Diverse Training Resources

Training for vocational education teachers should integrate resources from schools, enterprises, and industry associations. Schools can leverage theoretical teaching advantages by inviting subject experts for advanced theoretical lectures, while enterprises can provide real production scenarios and technical guidance, allowing teachers to participate in product development and process improvement projects. Industry associations can facilitate resource-sharing platforms, organizing technical discussions and experience exchanges between industry experts and teachers.

For example, the Yangtze River Delta vocational education alliance collaborates with automotive manufacturing enterprises, vocational schools, and industry associations to establish a training base for automotive manufacturing teachers, where enterprises provide the latest production equipment and standards, schools handle curriculum design, and industry associations coordinate resources, creating a “school-enterprise-association” collaborative training model that effectively enhances teachers' practical teaching abilities.

6.3 Innovating Training Methods and Evaluation Mechanisms

Traditional training primarily focuses on theory, which may not meet the practical capacity enhancement needs of teachers. Innovative training methods should incorporate project-based learning, workshops, and case studies. For instance, in training sessions for intelligent manufacturing teachers, actual production projects can be used as vehicles for teachers to complete the entire process from design to production, thereby mastering new technology applications in practice.

In relation to evaluation mechanisms, a system combining formative and summative assessments should be established. Formative assessments will focus on teachers' participation and practical performance, while summative assessments will consider outcomes such as developed teaching cases, industry practice reports, and technological innovations. After implementing a new evaluation mechanism, one vocational school reported an increase in training completion rates from 78% to 92%, with a 35% increase in the transformation rate of training outcomes.

7. Pathways for Professional Development and Capability Enhancement of Vocational Education Teachers Empowered by Technology

7.1 Enhancing Teaching Abilities with Artificial Intelligence

Artificial intelligence (AI) offers new avenues for enhancing teachers' pedagogical skills. Intelligent teaching platforms analyze student learning data to provide personalized teaching suggestions, enabling teachers to adjust their instructional strategies. For instance, a vocational college implemented an intelligent classroom system that monitors student engagement and knowledge acquisition in real

time, allowing teachers to optimize lesson pacing and content.

Additionally, virtual simulation technology transcends the temporal and spatial constraints of practical teaching. Teachers use virtual factories and laboratories to conduct classes, thereby allowing students to experience real production scenarios while simultaneously enhancing their practical teaching skills. In nursing education, virtual simulations can replicate diverse clinical cases, enabling teachers to guide students in operations and improve their clinical instruction capabilities.

7.2 Digital Tools Facilitating Educational Research Innovation

Digital tools provide robust support for innovative educational research. Big data analytics help teachers extract the value of teaching data, identify pedagogical challenges, and optimize course design. By analyzing students' online learning behaviors, teachers can accurately pinpoint weak areas and adjust the focal points of their curriculum. Furthermore, online collaboration platforms promote cross-institutional and interdisciplinary research activities, facilitating resource and experience sharing.

A vocational education group established a digital research platform that aggregates high-quality teaching resources from over 100 institutions nationwide. Through this platform, teachers engage in joint research and collaboratively develop modular courses, aligning educational content with industry needs, resulting in a 40% increase in research output efficiency.

8. Constructing Incentive Mechanisms for Professional Development and Capability Enhancement of Vocational Education Teachers

8.1 Establishing a Scientific Assessment and Evaluation System

A scientific evaluation system is crucial for motivating teacher development. Moving beyond solely student performance assessments, a multi-dimensional evaluation framework should be constructed, encompassing teaching quality, practical ability, research outcomes, and social service contributions. Teaching quality evaluation involves feedback from students, enterprises, and peers, while practical ability assessments are quantified through enterprise practice reports and competition results. Research achievements are evaluated with a focus on patents and technology standards.

Following the implementation of a new evaluation system at a vocational college, the number of teachers participating in enterprise technology service projects increased by 50%, and the developed institutional textbooks were adopted by over 20 colleges, significantly enhancing teaching quality.

8.2 Improving Incentive and Promotion Mechanisms

An effective incentive mechanism should blend material rewards with moral encouragement. Establishing specific awards, such as Teaching Innovation Awards and Technical Expert Awards, recognizes outstanding teachers with bonuses and training opportunities. Additionally, creating a teacher honor system with titles like "Distinguished Educator" and "Chief Technician" enhances professional pride.

Regarding promotion, pathways should be created for career development, including technical skill-based and research-oriented tracks. For instance, teachers can achieve higher ranks through obtaining senior technician qualifications or leading significant technological projects, thereby broadening professional advancement opportunities and fostering intrinsic motivation for professional growth.

9. Pathways for Cultivating Self-Development Awareness and Capabilities in Vocational Education Teachers

9.1 Guiding the Establishment of a Lifelong Learning Mindset

Given the rapid technological advancements in vocational education, teachers must embrace a lifelong learning philosophy. Institutions can host career development planning seminars and arrange experience-sharing meetings with exemplary teachers to help faculty recognize the importance of continuous learning. Moreover, fostering a learning-oriented campus culture by creating reading corners and academic salons provides platforms for teachers to exchange ideas.

For example, a vocational college initiated a "Book of the Month" reading activity, encouraging teachers to share insights from their

readings, which are then incorporated into teacher assessments, effectively enhancing their learning motivation and creating a vibrant learning atmosphere.

9.2 Promoting Teachers' Autonomous Professional Development Practices

To promote autonomous professional development, institutions must provide platforms and support. Establishing teacher development funds can assist faculty in undertaking personal teaching reforms and technological innovations. Additionally, encouraging participation in industry associations and academic organizations can help expand professional networks and resources. For instance, after joining the Intelligent Manufacturing Industry Association, a teacher collaborated with industry experts on technological research and successfully filed two invention patents, transforming the outcomes into teaching resources and significantly enhancing both personal professional capabilities and instructional quality.

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