THE IMPROVEMENT OF PROFESSIONAL TEACHING FOR TEACHERS IN HIGHER VOCATIONAL COLLEGES IN HUBEI PROVINCE

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Driven by China's rising demand for application-oriented talent, this study examines how teaching in Hubei higher vocational colleges can better align with enterprise needs. Using a mixed-methods design, we administered structured questionnaires and conducted semi-structured interviews with 45 instructors. Descriptive statistics and thematic analysis assessed teaching practices, industry integration, and institutional support. Results show that many instructors lack recent industry experience and struggle to embed real-world technologies and enterprise standards in coursework. Although motivation for enterprise-based training and curriculum reform is high, institutional support and mechanisms for continuous improvement remain limited. We recommend strengthening school–enterprise collaboration, expanding authentic workplace training for teachers, and adopting practice-oriented pedagogies. Building dual-qualified faculty and improving institutional alignment can enhance the quality, relevance, and practical effectiveness of vocational instruction. These insights inform policymakers and administrators seeking workforce-ready teaching systems.

Keyword : Vocational education, Teaching competencies, School-enterprise cooperation, Instructor development, Curriculum alignment

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CHAPTER 1
INTRODUCTION

This chapter introduces the background, rationale, and significance of the study on enhancing the professional teaching competence of instructors in higher vocational colleges in Hubei Province, with a specific focus on aligning teaching practices with the talent needs of enterprises involved in school-enterprise cooperation. It discusses the challenges faced by vocational educators in responding to the evolving demands of industry and the importance of adjusting teaching content and methods to meet real-world application scenarios. The chapter also presents the research objectives, research questions, scope, and structure of the study, laying a clear foundation for the subsequent chapters.

Background of the Study

With China's rapid economic development and ongoing industrial transformation, the demand for technically skilled and application-oriented talents has significantly increase(Qiao & et al., 2023). In the era of digitalization and globalization, traditional education models are no longer sufficient to meet the practical and evolving needs of the labor market, placing considerable employment pressure on university graduates(Voronkova & et al., 2023).Cultivating high-quality technical professionals who can quickly adapt to workplace requirements has become a key issue in the reform and development of vocational education.

Vocational education plays a critical role not only in supporting China's economic transformation but also in addressing structural employment challenges. Internationally, countries like Germany and Japan have established highly effective vocational education systems that closely integrate teaching with industry practice(Li & Pilz, 2023). For instance, Germany's dual education model requires educators to participate regularly in industry internships to stay aligned with technological

advancements. Japan has developed a comprehensive training framework to improve vocational teachers' interdisciplinary and hands-on teaching skills. In contrast,

China's vocational education system is still developing, particularly in terms of enhancing teachers' practical teaching abilities and aligning curricula with the needs of enterprise partners.

According to data from the Ministry of Education of China (Sciences & E, 2022), vocational education has become a major component of the higher education system, accounting for more than 50% of institutions nationwide. As of June 2023, China had 3,072 higher education institutions, including 1,545 vocational colleges(xinhuanet, 2024). This growth reflects the urgent need for technical talent and the rising importance of vocational education in national economic planning. In response, the amended Vocational Education Law (2022) emphasized the equal importance of vocational and general education, promoting industry-education integration, school-enterprise cooperation, and systemic support for high-quality vocational education.

Hubei Province, a key economic center in central China, views vocational education as an essential tool for regional economic upgrading and talent development. According to Li and et al. (2015), the province has 133 higher education institutions, of which 65 are vocational colleges, representing 48.9% of the total. Despite this strong foundation, a gap persists between vocational educators' professional teaching competencies and the rapidly evolving talent needs of cooperating enterprises. This mismatch affects both teaching effectiveness and student employability.

With the acceleration of industrial upgrading and technological innovation, enterprises now require vocational graduates with not only strong theoretical knowledge but also adaptable, hands-on skills. Accordingly, higher expectations are being placed on vocational educators to modernize their teaching content, engage with industry practices, and update instructional methods. However, many teachers still rely on traditional models and have limited access to real-world industry experience, which reduces students' professional competence and weakens their competitiveness in the job market(Tan & Du, 2022; Xun, 2024).

To better understand the current situation, this study analyzed 2023 student evaluation forms that assessed vocational educators in Hubei across three dimensions:

ideological attitude, teaching competence, and student guidance. A summary of the evaluation indicators is provided below:

Table 1 evaluation indicators

Primary Indicator (Score)	Secondary Indicator	Tertiary Indicator	Score
Ideological Attitude (20)	Political Ideology and Professional Ethics	Teaching by example; acting as a role model	8
	Teaching Responsibility	Undertaking tasks responsibly	7
	Educational Background	Bachelor's degree	4
	Ideological Support	Support for young teachers	5
Guidance for Teachers (40)	Teaching Performance	Average lesson preparation and delivery	4
	Internship Supervision	Some capability	5
	Research & Thesis Supervision	Weak research capacity	6

Table 1 (Continued)

Primary Indicator (Score)	Secondary Indicator	Tertiary Indicator	Score
	Monthly Conversations	Incomplete records	3
	Students Guided	Exceeded required number	8
	Academic Performance	Average, some improved	5
Student Guidance (40)	Ideological Development	Some student progress	6
	After-Class Tutoring	Less than twice/month	4
	Monthly Conversations	Incomplete records	5

The data reveal that many teachers exhibit significant weaknesses in research guidance, industry-practice supervision, and personalized student mentoring. These gaps negatively affect students' academic development and reduce their competitiveness in employment. In particular, limited involvement in enterprise environments prevents teachers from providing relevant, up-to-date guidance on internships and graduation projects. Similarly, insufficient after-class support restricts students' opportunities for academic exploration and career planning.

Overall, these findings highlight a misalignment between teachers' professional teaching capabilities and the expectations of enterprise partners. Addressing this disconnect is crucial for enhancing the quality of vocational education and supporting students' transition into the workforce. Therefore, this study seeks to investigate the

talent needs of school-enterprise cooperation enterprises in Hubei Province and to propose effective strategies for improving the professional teaching practices of vocational college instructors, with the ultimate goal of fostering high-quality technical talents that meet the demands of modern industry.

Problem Statement

As China enters a critical stage of economic transformation and industrial upgrading, vocational education has assumed increasing importance as a means of cultivating applied technical talents suited to the demands of a rapidly evolving labor market. Particularly in provinces such as Hubei, where industrial restructuring is closely tied to regional economic strategies, the capacity of vocational education to produce high-quality graduates is central to both workforce development and economic competitiveness.

Yet, despite policy emphasis on strengthening vocational education and promoting school-enterprise cooperation, the professional teaching competencies of instructors in Hubei's vocational colleges appear insufficient to meet the complex and dynamic needs of industry. This disconnect poses a significant challenge to the broader goal of aligning vocational training with practical employment outcomes.

One of the core issues lies in the limited responsiveness of teaching content to current industrial realities. While industries continue to advance in technology and production models, many vocational college instructors in Hubei still rely on conventional curricula and outdated course materials. As (Xinming, 2023) notes, the lack of timely curriculum renewal has resulted in a mismatch between what is taught and what enterprises require, leading to graduates who struggle to apply contemporary tools and techniques in real-world settings (Xinming 2023, Xun 2024)).

Furthermore, a substantial proportion of vocational teachers lack direct experience in industry. Practical exposure to enterprise operations is essential for teachers to effectively translate technical concepts into applied teaching and to provide relevant guidance on internships and project work. Fan and et al. (2024) emphasize that

insufficient industry engagement among teachers undermines the integration of vocational education with actual workplace practices. The result is a weakened foundation for cultivating the hands-on skills that employers increasingly prioritize(Fan & et al., 2024).

Equally concerning is the persistence of traditional lecture-based teaching methods, which remain dominant in many vocational classrooms. Although educational reforms have called for student-centered pedagogies—such as project-based learning, case teaching, and the integration of digital tools—these approaches are not yet widely adopted. Studies by Dabo (2023)and Du Li (2022)have highlighted that teaching innovation remains limited, constraining opportunities for students to develop independent learning abilities, creativity, and problem-solving skills—all of which are critical in today's employment landscape(Dabo, 2023; Du Li, 2022).

Taken together, these issues point to a deeper structural misalignment between the current state of professional teaching in vocational colleges and the expectations of modern industry. Specifically, the lack of industry-responsive curricula, limited teacher engagement with enterprise practices, and reliance on outdated teaching methods collectively weaken the capacity of vocational education to fulfill its role as a talent development platform.

This study, therefore, seeks to explore the core challenges faced by vocational college teachers in Hubei Province in aligning their professional teaching practices with enterprise talent needs. Through empirical analysis and an investigation of school-enterprise cooperation mechanisms, the study aims to propose practical strategies for enhancing teaching quality and relevance. In doing so, it contributes to the broader goal of improving vocational education's effectiveness in supporting economic transformation and responding to labor market demands.

Objectives of the Study

This study aims to align the professional teaching practices of teachers in higher vocational colleges in Hubei Province with the talent needs of enterprises

engaged in school-enterprise cooperation. Through research and analysis, the study seeks to provide practical ideas for improving the quality and relevance of professional teaching. The specific objectives are as follows:

To investigate the talent demands of enterprises that cooperate with higher vocational colleges in Hubei Province.

To propose improvement strategies for the professional teaching of vocational college teachers based on industry needs.

Significance of the Study

This study holds both theoretical and practical significance in the context of improving the professional teaching competencies of vocational college instructors in Hubei Province, particularly in response to industry-driven talent needs under school-enterprise cooperation frameworks.

1. Advancing the Alignment Between Vocational Teaching and Industrial Talent Demands

By investigating the gap between current teaching practices and the evolving needs of industry, this study provides empirical evidence and strategic insights that support the integration of enterprise practices into vocational teaching. This contributes to enhancing the job-readiness and adaptability of students and strengthens the relevance of vocational education in regional economic development.

2. Promoting Professional Development and Teaching Innovation

The study explores practical pathways for improving teachers' pedagogical skills, including curriculum renewal, teaching method innovation, and information-based instruction. It emphasizes the importance of ongoing professional development through flexible training mechanisms such as online platforms and industry-based workshops, helping teachers respond to educational and technological change.

Enhancing Institutional Decision-Making and Policy Design

3. The findings offer theoretical support and practical recommendations for vocational colleges—particularly Ezhou Vocational University—in developing teaching

improvement policies, talent development strategies, and teacher evaluation mechanisms. These insights can help institutional leaders formulate more targeted and effective management measures.

4. Providing Transferable Models for Broader Vocational Education Reform

While the study focuses on Ezhou Vocational University, the frameworks and strategies proposed—particularly in regard to school-enterprise collaboration and teacher competency development—can be adapted and implemented by other vocational institutions across China. As such, the study offers referential value for broader reform efforts within the national vocational education system.

Scope of the Study

In this study, the researchers identified the following scope:

1. Research Sample

The research sample consists of 45 teachers from the Faculty of Mechanical Engineering at Ezhou Vocational University.

2. Research Variables

2.1 Demographic Variables

2.1.1 Gender: The research sample includes both male and female teachers, analyzing their roles and impact on teaching.

Below 30 years

30-40 years

40-50 years

Above 50 years

2.1.2 Professional Title:

Teaching Assistant

Lecturer

Associate Professor

Professor

2.1.3 Years of Teaching Experience:

Less than 5 years

6-10 years

11-15 years

16-20 years

Over 21 years

2.1.4 Educational Background:

Bachelor's Degree

Master's Degree

Doctorate

Independent Variable:

Professional Teaching Competency of Teachers

Dependent Variables:

1. Improvement in Teachers' Professional Teaching Competency
2. Enhancement of Student Learning Outcomes

Control Variables:

1. Alignment with Market Demands
2. Balanced Emphasis on Knowledge and Skills
3. Optimization of Faculty Resources
4. Reinforcement of Practical Instruction
5. Scientific Curriculum Design and Development
6. Strengthening of School-Enterprise Cooperation
7. Career Development Guidance
8. Teaching Quality Assessment
9. International Exchange and Collaboration
10. Adherence to Legal and Regulatory Compliance

3. Content Scope

This study focuses on a systematic examination of the professional teaching practices of faculty members in the Faculty of Mechanical Engineering at Ezhou Vocational University. Using a structured Likert five-point scale questionnaire, the

study investigates five key dimensions that reflect both internal pedagogical processes and external demands from industry partners. These dimensions include: course design and planning, practical teaching and equipment application, teaching methods and instructional reflection, student-centered interaction and support, and industry-academia collaboration within the context of integrating production and education.

3.1 Course Design and Planning

This dimension aims to evaluate how faculty members align teaching objectives with expected learning outcomes while incorporating emerging industrial technologies into curriculum planning. It further examines the extent to which instructors emphasize core disciplinary concepts and adjust instructional content based on student learning feedback and enterprise standards.

3.2 Practical Teaching and Equipment Application

This section investigates how teachers utilize advanced machinery, tools, and software—such as CAD and CAM—in hands-on teaching sessions. It also considers the degree of integration between classroom instruction and external industry-based training environments. The goal is to assess how real-world projects and industrial resources are leveraged to enhance students' practical and job-ready competencies.

3.3 Teaching Methods and Instructional Reflection

This dimension focuses on how faculty members adapt and refine their teaching strategies in response to diverse student learning needs. The study examines whether instructors engage in regular pedagogical self-reflection and iterative improvement to ensure teaching quality and learning effectiveness.

3.4 Student-Centered Support and Communication

This section analyzes how teachers respond to students' academic needs through interactive teaching, formative feedback, and personalized guidance. It further explores the role of after-class tutoring and one-on-one academic mentoring in helping students overcome learning obstacles and deepen their understanding of core mechanical engineering concepts.

3.5 Industry-Academia Collaboration and Integration of Production and Education

This dimension examines how faculty members collaborate with industry partners to integrate up-to-date technologies, operational standards, and practical case scenarios into teaching. It also analyzes joint course development initiatives, training programs, and applied research projects that foster meaningful school-enterprise cooperation. The objective is to evaluate how such collaborations contribute to developing students' ability to solve real-world engineering problems.

4. National Policy Document

"The Twenty Basic Principles of Vocational Education"

5. Research Timeline

The research timeline spans from August 2024 to December 2024, with specific milestones planned as follows:

October 2024: Completion and defense of the first three chapters.

November 2024: Conducting surveys and interviews, collecting data.

Mid-November to December 2024: Data analysis and strategy formulation, with experts invited to evaluate the feasibility of the strategies.

December 2024: Writing the research report and submitting the final dissertation.

Expected Outcome

Based on the findings of this study, the following outcomes are anticipated:

1. Improved Teaching Effectiveness and Student Employability
2. Evidence-Based Guidance for Institutional Policy and Teaching Reform
3. Development of a Multi-Dimensional Teacher Evaluation Framework
4. Strengthened School-Enterprise Collaboration and Curriculum Relevance
5. Enhanced Teaching Innovation and Digital Competency Among Faculty
6. Optimized Faculty Development Strategies in Vocational Institutions

7. Contribution to Regional Vocational Education Reform and Quality Improvement

Definition of Terms

Ezhou Vocational University: A public higher vocational institution located in Hubei Province, focusing on the cultivation of skilled technical talents through practice-oriented education. It serves as the case study institution for this research on improving professional teaching in the context of school-enterprise cooperation.

Faculty of Mechanical Engineering: A core department within Ezhou Vocational University that offers programs in mechanical design, manufacturing, and automation. It emphasizes practice-based learning and industry relevance, making it a representative unit for examining teaching practices in technical disciplines.

Higher Vocational Education Institutions: Post-secondary institutions that focus on developing applied technical talents to meet labor market demands. Their programs are characterized by curriculum modularization, practical teaching, and strong linkages with industry, aiming to enhance students' job-readiness and technical competence.

Teaching Competency: Refers to the integrated set of professional, pedagogical, and cognitive skills that enable teachers to design, deliver, and evaluate effective instruction. It includes subject knowledge, instructional design, classroom management, and the ability to adapt to students' learning needs and industry developments.

Professional Development: An ongoing, lifelong process through which teachers improve their instructional capabilities, subject expertise, and adaptability to educational reforms. In vocational education, professional development often involves participation in training, research, and enterprise practice.

The Twenty Basic Guidelines for Vocational Education: A national policy framework issued by the Chinese government outlining the strategic priorities and quality standards for vocational education. It includes principles related to curriculum

design, teacher development, school-enterprise partnerships, and evaluation systems, aiming to ensure alignment with industrial needs and improve educational outcomes.

School-Enterprise Cooperation: A collaborative model in which vocational institutions and industry partners jointly engage in curriculum development, talent training, and practical teaching. It serves as a key mechanism for integrating vocational education with real-world industrial practices.

Integration of Production and Education: A structural approach that embeds industrial processes, technologies, and standards into teaching and training activities. It emphasizes real-work scenarios in vocational education to enhance students' practical problem-solving skills and teachers' engagement with industry trends.

Research Hypotheses

H1: Implementing an instructional program aligned with enterprise talent needs identified through school-enterprise cooperation and guided by the Twenty Basic Guidelines for Vocational Education will significantly enhance the professional instructional competency of vocational college teachers in Hubei Province, and improve students' job-readiness and professional performance.

Research Framework

To formulate an ideological framework for this study, the researcher introduced concepts and theories from literature and research results related to development concepts.

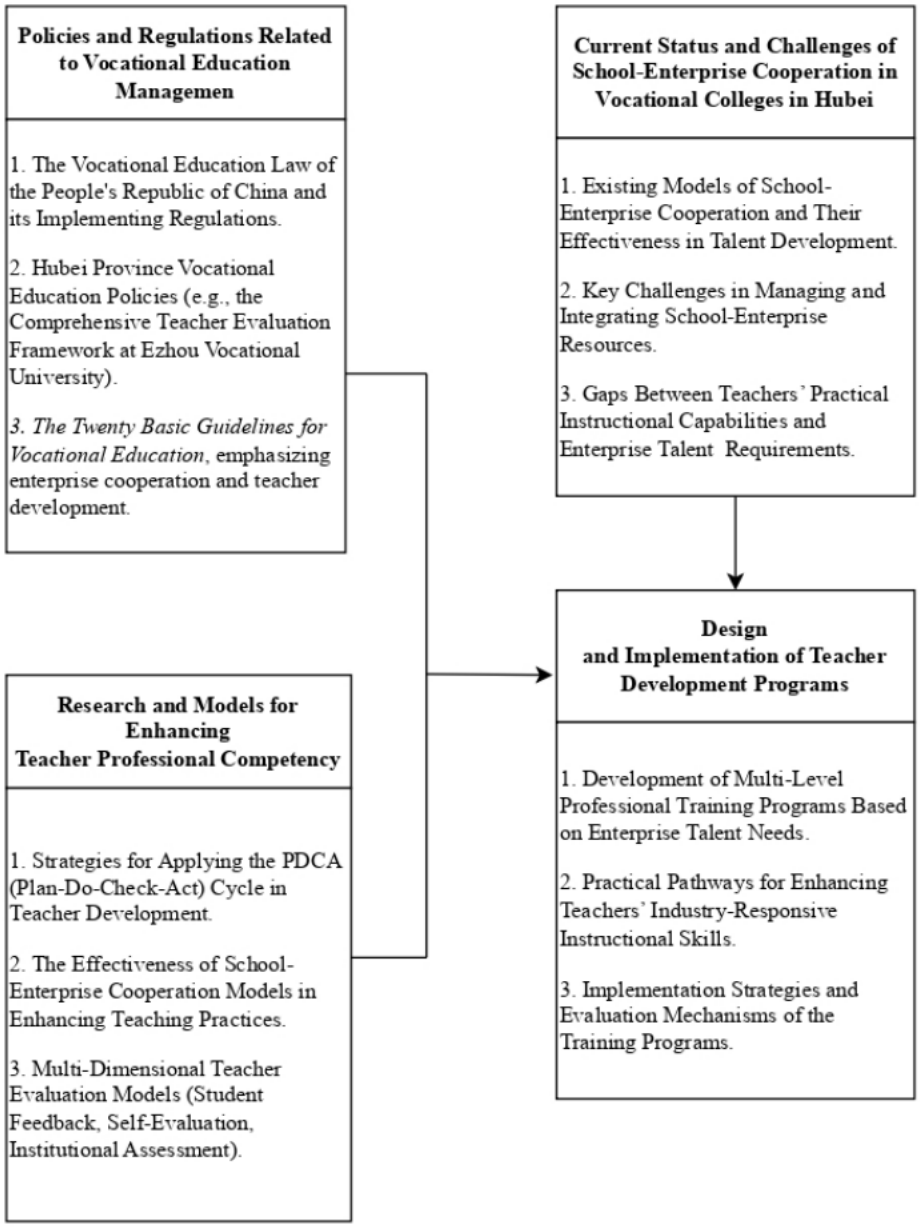

Figure 1 Research Framework

CHAPTER 2

LITERATURE REVIEW

The purpose of this study is to examine how systematic and industry-aligned teacher training programs can enhance the professional instructional competencies of mechanical engineering faculty in vocational colleges in Hubei Province. Specifically, the research explores how school-enterprise cooperation mechanisms and enterprise talent demands can inform the design and implementation of effective training strategies aimed at improving teachers' practical teaching skills. To establish a solid theoretical foundation, this chapter reviews relevant literature across several interconnected areas. It begins by defining the structural characteristics and educational objectives of vocational colleges to contextualize the distinctive demands of vocational instruction. It then explores the national and provincial policy frameworks that guide teacher development in China, with particular attention to reforms promoting school-enterprise collaboration. The discussion proceeds to clarify the concept of professional teaching competency, including its key components such as subject expertise, pedagogical techniques, and the integration of industry practices into instruction. In addition, this chapter examines models and strategies for designing teacher training programs that effectively bridge the gap between academic content and real-world industrial application. Finally, it reviews empirical studies on vocational teacher development, both in China and internationally, to highlight existing research gaps and underscore the relevance of this study. The literature review is organized into seven sections that address:

1. Definition and Characteristics of Higher Vocational Colleges
2. Legal and Policy Frameworks for Teacher Development
3. Definition and Components of Professional Teaching Skills
4. Design and Implementation of Teacher Training Programs
5. Overview of Teacher Competency Development Models
6. School enterprise cooperation
7. Relevant Research Studies

2.1 Definition and Characteristics of Higher Vocational Colleges

2.1.1 Definition and Educational Positioning of Higher Vocational Colleges

1. Definition of Higher Vocational Colleges

Higher vocational colleges constitute a vital segment of the higher education system, with the primary mission of cultivating technically skilled professionals. These institutions are characterized by a strong emphasis on practical application, close industry collaboration, and a pronounced role in supporting regional economic development. Fundamentally, they represent not only an educational model but also a complex institutional arrangement embedded within the national development strategy, socioeconomic structures, and cultural capital systems.

For instance, Gale (2022), from a sociocultural standpoint, argues that vocational education should not be viewed merely as a "subordinate" or "supplementary" form of higher education, but rather be redefined as a legitimate cultural good with intrinsic aesthetic and social value. Drawing on Bourdieu's theory of cultural capital, Gale emphasizes that vocational education's marginalized status stems more from the lack of symbolic legitimacy in its form than from any actual functional deficiency(Gale, 2022). Enhancing its societal recognition thus requires legitimizing its practice-oriented nature and technical strength within the realm of cultural discourse. In alignment with this perspective, Zeng (2024) observes that China's higher vocational colleges—particularly those designated as provincial high-level institutions—have aligned themselves with key national strategies by deepening school-enterprise cooperation, implementing the "High-level Vocational Colleges and Programs Initiative" (commonly referred to as the "Double High Plan"), and developing advanced professional clusters. These colleges not only serve as talent pipelines for local industries but also play a leading role in curriculum reform, governance modernization, digital transformation, and internationalization.

From a pedagogical standpoint, higher vocational education adopts a "learning by doing" approach. Curricula are designed in close accordance with local industrial needs. Faculty members are often dual-qualified, possessing both teaching

credentials and relevant industry experience. Students acquire job-ready skills through school-enterprise partnerships, hands-on training, and the 1+X multi-credentialing system, which combines academic qualifications with professional certifications. This model strengthens the alignment between education and labor market demands, positioning vocational colleges as critical nodes linking education, technology, and economic productivity(Zeng, 2024).

In sum, higher vocational colleges have transitioned from peripheral players to central actors within China's higher education landscape. They now serve both strategic and foundational functions—enhancing educational equity, fostering workforce development, and contributing to social mobility. These institutions embody an educational philosophy wherein technical proficiency is seen as intelligence, and hands-on practice as a pathway to excellence.

2. Educational Positioning

Higher Vocational Education (HVE) in China is no longer simply considered a supplementary tier to traditional undergraduate education. Instead, it has been repositioned as a central pillar of the higher education system, tasked with cultivating highly skilled technical professionals in alignment with national strategies and regional economic needs. Defined by its dual orientation toward "employment-focused" and "service-oriented" objectives(Zeng, 2024), HVE emphasizes practical competence and industry-readiness. In recent years, its development has been shaped by both structural transformations and policy interventions. Notably, the State Council's Decision on Accelerating the Development of Modern Vocational Education (Guo Fa [2014] No. 19) first proposed undergraduate-level vocational education. In response, the Ministry of Education initiated institutional transformations, including restructuring and mergers, resulting in the establishment of 33 vocational universities by 2023—solidifying HVE as a distinct and recognized component of China's higher education architecture (Zhang 2023).

In terms of its functional role, HVE serves as a strategic mechanism for supporting regional industrial development, alleviating shortages of technical personnel,

and promoting balanced regional economic growth. As Müller (2024) observed through spatial analysis, disparities in the distribution of vocational education institutions have led to mismatches between skills supply and local labor demands(Müller, 2024). This highlights the importance of HVE not only as a training platform but also as a key infrastructure for regional economic transformation. Moreover, HVE plays a vital role in promoting educational equity and social mobility. According to Billett and et al. (2022), vocational education worldwide has served as an access pathway for marginalized groups traditionally excluded from higher education systems. Within the framework of social justice, HVE represents an essential instrument for democratizing access to education—functioning as a mechanism of opportunity redistribution and therefore assuming a critical role in broader societal development (Billett & et al., 2022).

Concurrently, with the rapid evolution of emerging technologies and industrial structures, HVE in China is undergoing a shift from a purely skills-oriented model to one that fosters integrated competencies. In their construction of a comprehensive evaluation index system, Han and et al. (2023) emphasized metrics such as educational quality, graduate employability, and further education rates—underscoring the transition toward diversified outcome expectations. This reflects a broader trend within HVE: meeting immediate technical labor demands while also supporting long-term goals such as sustainable development and the advancement of a lifelong learning society (Han & et al., 2023).

In summary, the positioning of HVE is shifting from a peripheral, skill-transmission platform to a multidimensional institutional space that integrates goals of educational equity, economic modernization, social integration, and cultural revitalization. Within both China's domestic context and the global educational landscape, HVE is steadily shedding its marginal status and establishing itself as a foundational institutional pillar—essential to driving societal transformation and enabling the transition to a high-skill, innovation-driven economy.

2.1.2 Characteristics of Teaching and Talent Cultivation in Higher Vocational Colleges

As China undergoes economic transformation and industrial upgrading, higher vocational education (HVE) plays a vital role in cultivating skilled talent to meet the evolving needs of the job market(Krishnasamy, 2024; Zong, 2024). Rather than serving as a supplementary layer to traditional academic education, HVE has established itself as a distinct and strategic pathway within the higher education system, with a strong emphasis on practical skills, employment readiness, and service to regional industries. The teaching and talent cultivation strategies adopted by vocational colleges are thus closely aligned with national development priorities, industry expectations, and social needs.

A defining feature of HVE is its market-oriented and employment-driven educational philosophy(Grotkowska & et al., 2015; Köpsén, 2020). Vocational colleges tailor their curricula to reflect the dynamic demands of employers, ensuring that the instructional content is practical, job-relevant, and competency-based. Curricula are designed in close collaboration with enterprises, and updated regularly to incorporate cutting-edge technologies, workplace procedures, and professional standards. This ensures that students can transition smoothly from education to employment, addressing labor market mismatches and improving job readiness. Teachers, in this context, are required not only to deliver foundational theoretical knowledge but also to integrate industry case studies and simulations into classroom instruction, cultivating applied technical competence and workplace adaptability(Guo & Li, 2024).

The integration of theory and practice is another hallmark of vocational pedagogy. Higher vocational institutions adopt instructional models that blend classroom learning with hands-on experiences, including internships, industry placements, laboratory simulations, and national skills competitions(Christiansen & Even, 2024; Mesuwini, 2021). This dual approach ensures that students acquire both cognitive understanding and operational proficiency. For example, students in automotive programs may repair real vehicles under industry supervision, while those

studying tourism management gain practical experience through hotel internships. Teachers are encouraged to undergo industry training themselves, so they can effectively bridge academic instruction and workplace realities, using tools such as project-based learning (PjBL), case-based instruction, and competency assessment frameworks.

School-enterprise cooperation and industry-education integration are fundamental mechanisms underpinning talent cultivation in HVE (He, 2024; Wan & Hao, 2023). Vocational colleges actively form strategic alliances with local enterprises to co-develop training bases, co-design programs, and implement co-teaching models. These partnerships bring enterprise professionals into the classroom as adjunct instructors, facilitate real-world project participation, and allow students to receive instruction on-site in enterprise settings. Teachers are central figures in managing these collaborative ecosystems. Their responsibilities include aligning teaching objectives with industry needs, managing joint training programs, and continuously updating course content to reflect emerging industrial technologies and standards.

Moreover, HVE emphasizes the cultivation of holistic competencies alongside technical training. This includes fostering communication skills, teamwork, professional ethics, innovation awareness, and entrepreneurial thinking(Li, 2025; Sen, 2025). Institutions offer modules in career development, entrepreneurship education, and interdisciplinary problem-solving, while encouraging student participation in leadership workshops and innovation contests. Teachers play a pivotal role in nurturing these skills through instructional strategies that emphasize experiential learning, real-life scenario simulation, and the use of digital technologies such as virtual reality (VR) and intelligent teaching platforms. These approaches not only promote deeper engagement but also prepare students for the complexities of the modern workplace.

In conclusion, the teaching and talent cultivation model in higher vocational colleges is characterized by strong alignment with labor market needs, integration of theoretical and practical learning, extensive enterprise collaboration, and the development of well-rounded professional capabilities. Teachers serve as both

instructors and industry mediators, and their continuous professional development is crucial to the success of the educational model. This multidimensional approach ensures that HVE remains an effective conduit for producing the technically competent, adaptable, and socially responsible workforce needed in today's knowledge-driven economy.

2.2 Legal and Policy Foundations for Teacher Development

The legal and policy framework that underpins teacher development in vocational education in China is crucial for ensuring that educators are well-equipped to meet the evolving demands of the labor market and provide high-quality vocational training. This section delves into the Vocational Education Law of the People's Republic of China, alongside other policy frameworks such as the Twenty Basic Guidelines for Vocational Education, and their specific implications for the development of vocational education teachers.

2.2.1 Policy Requirements of the Vocational Education Law of the People's Republic of China

The Vocational Education Law of the People's Republic of China serves as the cornerstone for the regulation and development of vocational education across the nation. It establishes vocational education as equally important as general education, aiming to eliminate historical biases and ensure parity in terms of educational quality, resources, and professional recognition. The law provides a comprehensive legal framework for promoting school-enterprise cooperation and enhancing the vocational education teacher workforce, ensuring that teachers are prepared to meet the practical and theoretical requirements of modern industries. The revision and subsequent implementation of this law demonstrate the state's commitment to vocational education as a strategic priority for national development, while also offering policy support for the professionalization of teachers and the enhancement of practical instruction.

1. Emphasizing the Equal Status of Vocational and General Education

The revised Vocational Education Law explicitly recognizes vocational education as holding equal legal status to general education for the first time. This shift is designed to challenge societal biases that have historically undervalued vocational training and to elevate its social and professional standing. By granting vocational education equal importance, the law creates a legal environment where vocational educators are afforded the same opportunities and resources as their counterparts in general education. This provision not only enhances the social recognition of vocational education but also provides educators with greater opportunities for career progression, professional development, and recognition within the educational system. As a result, vocational teachers are positioned as integral contributors to the education system, with a broader role beyond merely imparting technical skills.

2. Promoting School-Enterprise Cooperation and Industry-Education Integration

A significant emphasis of the Vocational Education Law is on the promotion of school-enterprise cooperation. The law mandates that vocational colleges establish and maintain close partnerships with enterprises to foster a collaborative education model. This approach is critical in aligning vocational training programs with the practical needs of the labor market. By encouraging enterprises to take an active role in curriculum development, providing practical training bases, and involving technical experts in teaching, the law aims to ensure that the skills taught in vocational institutions are relevant and aligned with industry standards. Such collaboration enables vocational education to be both forward-looking and practical, ensuring that students are well-prepared for immediate entry into the workforce with skills that match industry requirements.

3. Enhancing Teacher Development and Professional Support

The law also underscores the importance of building a qualified and competent vocational teaching workforce. It promotes the development of “dual-qualified” teachers who not only possess the necessary instructional competencies but

also have relevant industry experience. The government supports teacher development through policies that facilitate ongoing professional development, including opportunities for teachers to engage in continuing education programs and industry-based training. This approach ensures that teachers have up-to-date knowledge and skills, enabling them to deliver both theoretical and practical instruction effectively. By providing structured opportunities for skill enhancement, the law seeks to create a dynamic and adaptable teaching workforce capable of meeting the evolving needs of various industries.

4. Establishing a Teaching Quality Evaluation and Feedback System

To further enhance the quality of vocational education, the law proposes the establishment of a scientific system for evaluating teaching standards. This system involves periodic assessments of teaching quality at vocational institutions, using the results as a basis for ongoing improvement. The law emphasizes the importance of incorporating feedback from multiple sources, including students, teachers, and industry experts, to provide a comprehensive evaluation of teaching effectiveness. Such a multi-stakeholder approach ensures that vocational education remains responsive to the needs of learners and the demands of industries. By systematically evaluating and improving teaching practices, the law aims to create a culture of continuous quality enhancement within vocational education.

5. Promoting Internationalization and Innovation in Vocational Education

The law supports the internationalization of vocational education by promoting exchanges and partnerships with foreign educational institutions. This international outlook is intended to bring advanced teaching methods, technologies, and concepts into the Chinese vocational education system, enhancing its competitiveness and global relevance. By establishing international partnerships, vocational colleges can expose teachers to best practices and innovative teaching methods, allowing them to enhance their digital teaching skills and foster greater interactivity in the classroom. The integration of international perspectives is particularly valuable in equipping students with the skills necessary for a globalized economy.

2.2.2 Policy Framework for Supporting Teacher Development

The Twenty Basic Guidelines for Vocational Education serve as a comprehensive policy framework that outlines the key areas for the development of vocational education in China. These guidelines cover various aspects such as market alignment, school-enterprise collaboration, teaching innovation, professional development of teachers, and practical instruction. By providing a clear and structured policy direction, these guidelines aim to enhance the quality of vocational education and ensure that teachers are adequately supported in their professional growth.

1. Market-Driven Curriculum Reform (Guideline No. 1)

The guidelines emphasize that vocational education must closely align with market demands, adjusting programs and curriculum design to reflect changes in the employment landscape. This market-oriented approach ensures that vocational education remains relevant and effective in preparing students for current and future job opportunities.

2. Balanced Knowledge and Skills Instruction (Guidelines Nos. 2 and 4)

Instruction should focus on developing both theoretical knowledge and practical skills, with a particular emphasis on enhancing practical teaching components. Teachers are encouraged to participate in industry practices, allowing them to effectively integrate theoretical concepts with practical applications in the classroom.

3. Enhancing Faculty Quality and Developing “Dual-Qualified” Teachers (Guideline No. 3)

The guidelines aim to build a high-quality teaching workforce by promoting the development of “dual-qualified” teachers with expertise in both teaching and industry. By participating in industry placements and professional training, teachers can gain hands-on experience, ensuring their instruction is aligned with industry practices.

4. School-Enterprise Collaboration and Industry-Education Integration (Guidelines Nos. 8 and 5)

Promoting collaboration between schools and enterprises is a critical aspect of the guidelines. Joint curriculum development and project-based learning initiatives ensure that education is deeply integrated with industry, enhancing the relevance and effectiveness of vocational training.

5. Teaching Quality Assessment and Continuous Improvement (Guideline No. 16)

A robust system for assessing teaching quality is essential for continuous improvement. By combining feedback from multiple stakeholders, such as students, peers, and industry experts, vocational institutions can foster an environment where teachers are continuously reflecting on and enhancing their teaching practices.

6. Promoting Innovation and Entrepreneurship Education (Guideline No. 11)

Innovation and entrepreneurship are increasingly important in vocational education. The guidelines encourage teachers to engage in training that develops these skills, helping them foster innovative thinking and entrepreneurial competencies among students.

7. Internationalization of Teacher Development and Digital Instruction (Guideline No. 19)

Global partnerships are essential for exposing teachers to new instructional methods and technological advancements. Teachers are encouraged to participate in international exchange programs to broaden their perspectives and acquire digital teaching techniques, enhancing interactivity in the classroom.

8. Support for Career Development and Lifelong Learning (Guidelines Nos. 14 and 18)

These guidelines highlight the importance of providing teachers with ongoing learning opportunities, including retraining and continuing education. By supporting career development and lifelong learning, vocational colleges can create a dynamic and continually improving teaching workforce.

9. Educational Equity and Resource Distribution (Guideline No. 15)

Ensuring that all teachers have equal access to development opportunities is essential. The guidelines call for the fair distribution of vocational education resources, minimizing disparities and ensuring that all educators benefit from professional development programs.

2.2.3 Teacher Evaluation Standards at Ezhou Vocational University

The teacher evaluation standards at Ezhou Vocational University are a vital instrument for enhancing teaching quality and fostering professional development among educators. This system is designed to be multidimensional, encompassing a range of evaluation criteria beyond traditional measures. It includes theoretical and practical instruction, research capabilities, classroom management, student feedback, and practical teaching guidance (Ezhou University Comprehensive Teacher Evaluation Scheme, 2024). Such a holistic and comprehensive evaluation framework allows the university to identify strengths and weaknesses in teachers' instructional approaches, providing a foundation for developing targeted strategies to enhance their competencies. This section delves into the various components of the evaluation system, detailing the specific criteria and mechanisms involved.

1. Student Evaluation

Student evaluation is a crucial element of the teacher assessment process, accounting for 20 points in the comprehensive teacher assessment system. This component captures students' perceptions of their teachers' performance, offering a perspective that is both immediate and relevant. Students, as direct recipients of the educational process, provide valuable insights into how effectively the lessons are delivered and how conducive the classroom environment is to learning. The evaluation forms administered to students cover multiple aspects of teaching, including classroom discipline, lesson preparation, instructional methods, and the overall effectiveness of teaching strategies (Ezhou University Comprehensive Teacher Evaluation Scheme, 2024).

The significance of student feedback lies in its ability to provide direct and immediate feedback to educators, as students are the primary participants in

classroom activities. Research indicates that classroom interaction significantly influences teaching effectiveness. An engaging classroom environment, where interaction is facilitated effectively, can greatly enhance student motivation and learning outcomes. Parmigiani (2024) highlight the importance of student feedback in enabling teachers to assess the efficacy of their instructional methods. By reviewing student responses, teachers can identify areas for improvement, allowing them to adapt their teaching strategies to foster a more engaging and effective learning environment. Such adjustments based on student input are instrumental in enhancing the overall quality of teaching, making student feedback an indispensable tool in the continuous improvement process.

Furthermore, the importance of student evaluation extends beyond immediate feedback; it also serves as a metric for long-term teaching development. Regularly collected student feedback can be analyzed over time to detect patterns in teaching effectiveness, allowing for the development of tailored professional development plans. These plans can then address specific areas identified as needing improvement, ensuring that teachers receive targeted support that directly impacts their instructional quality.

2. Teacher Self-Assessment

The teacher self-assessment component accounts for 5 points in the overall evaluation framework. It serves as an essential tool for encouraging teachers to reflect on their own performance and teaching practices from a personal perspective. This self-reflection process not only allows educators to gain insight into their strengths and weaknesses but also provides an opportunity for self-improvement. Teacher self-assessment is rooted in the concept of reflective practice, which emphasizes the importance of continuous self-evaluation as a means of professional growth (Ezhou University Comprehensive Teacher Evaluation Scheme, 2024).

Reflective Practice Theory, as articulated by Schön (1983), underscores the value of reflection in understanding and improving instructional methods. By engaging in regular self-assessment, teachers can critically analyze their

classroom management, instructional strategies, and student engagement techniques. This process enables educators to identify specific challenges they encounter and to develop concrete strategies for addressing these issues in future lessons. In vocational education settings, where the integration of theory and practice is paramount, self-assessment is particularly important. Teachers must constantly evaluate how well they are blending theoretical instruction with practical application to ensure that students are receiving an optimal learning experience that prepares them for real-world vocational demands.

The self-assessment mechanism is not only beneficial for individual teachers but also supports the broader goals of institutional development. By encouraging educators to take ownership of their professional growth, the university fosters a culture of continuous improvement and professional responsibility. Moreover, the insights gained from self-assessment can be incorporated into larger professional development programs, ensuring that teachers receive the support they need to refine their instructional practices.

3. Evaluation by the College or Departmental Assessment Committee

The evaluation conducted by the college or departmental assessment committee is the most comprehensive and critical aspect of the evaluation system, carrying 26 points. This component is carried out by a committee composed of senior educators and educational administrators who conduct classroom observations, review teaching documentation, and evaluate teachers' preparedness, attitude, classroom performance, and course design (Ezhou University Comprehensive Teacher Evaluation Scheme, 2024). This peer evaluation method not only offers teachers professional insights into their instructional performance but also provides valuable expert feedback for targeted improvement.

In vocational education, where the alignment of curriculum content with industry standards is crucial, the evaluation process conducted by the assessment committee plays a pivotal role. Teachers are required to demonstrate a thorough understanding of industry trends and incorporate these into their curriculum planning.

The committee assesses the relevance and effectiveness of the course design, ensuring that it aligns with the latest industry standards and provides students with the technical knowledge and hands-on experience needed to succeed in their fields(Zhang & et al., 2025). Such alignment is critical to preparing students for the realities of the job market and ensuring that the education they receive is both current and practical.

Furthermore, the peer evaluation process allows for a comprehensive analysis of instructional practices. By observing lessons and reviewing course materials, the committee can provide detailed feedback on a teacher's strengths and areas for improvement, ranging from lesson planning and delivery methods to classroom management and student engagement strategies. This multidimensional assessment ensures that teachers receive well-rounded support, enabling them to refine their instructional approaches and improve student outcomes.

The teacher evaluation standards at Ezhou Vocational University employ a comprehensive, multidimensional assessment system that integrates various forms of feedback, including student evaluations, teacher self-assessments, and peer evaluations by senior educators. This well-rounded framework provides a holistic perspective on teaching performance, ensuring that no single aspect of instructional quality is overlooked. Additionally, by evaluating practical teaching and research capabilities, the system supports the holistic development of teachers. Continuous assessment and feedback allow teachers to create individualized improvement plans based on evaluation outcomes, ensuring that their teaching methods and content align with industry developments and student needs.

The integration of multiple assessment dimensions not only aids in identifying areas of improvement for individual teachers but also contributes to broader institutional development. The evaluation results are used to inform professional development programs, ensuring that teachers are equipped with the skills and knowledge necessary to meet industry demands and enhance student learning experiences. By aligning the evaluation system with industry standards, Ezhou Vocational University ensures that its instructional practices remain relevant and

effective, ultimately supporting the development of a high-quality vocational education system that meets the evolving needs of both students and the job market.

This systematic approach to teacher evaluation provides a blueprint for ongoing enhancement, fostering an environment where teachers are encouraged to grow continuously in their professional roles. It also serves as a model for other vocational institutions seeking to implement similar evaluation systems aimed at improving teaching quality and teacher development in alignment with industry standards.

2.3 Connotations and Components of Teachers' Professional Skills

Teachers' professional skills represent the comprehensive abilities demonstrated by educators during the instructional process and are the core elements ensuring the quality of education. In vocational colleges, teachers must not only possess a strong foundation in subject knowledge but also exhibit a wide range of skills, including practical teaching, classroom management, and student guidance. These competencies directly impact teaching effectiveness and the development of students' professional capabilities. The development of teachers' professional skills is centered around teaching theory, instructional practice, and professional ethics, with a particular emphasis on integrating theoretical knowledge with industry needs in vocational education (Zhuravlova & et al., 2021).

2.3.1 Definition of Teachers' Professional Skills

Teachers' professional skills encompass the professional knowledge, practical expertise, instructional methods, teaching innovation capabilities, and professional ethics required in the teaching process. These skills reflect not only the teacher's grasp of domain-specific knowledge but also their ability to transform this knowledge into instructional content, apply effective teaching strategies, manage classrooms, and guide students in their career development (Radkevych & et al., 2021).

In the context of vocational education, teachers' professional skills place a greater emphasis on alignment with industry practices. Teachers need to continuously update their knowledge base, acquiring the latest industry technologies and standards

to ensure that students can swiftly adapt to market requirements upon graduation. Therefore, teachers' professional skills are not only a requisite for instructional tasks but also a critical component in enhancing students' employability.

2.3.2 Core Components of Teachers' Professional Skills

1. Mastery of Subject Knowledge and Theoretical Understanding

A teacher's level of subject knowledge determines the foundation of their instructional competence. Teachers must have an in-depth understanding of their specialized field and be able to convey complex theoretical concepts in a manner accessible to students. In vocational education, this capability includes:

Knowledge of the latest developments in fields such as intelligent manufacturing and information technology.

The ability to translate abstract theories into accessible instructional content.

2. Adaptability to Market Demands

Adaptability to market demands is one of the essential skills for vocational education teachers. Teachers must stay informed about industry trends and market needs, adjusting their teaching content and strategies accordingly. This involves:

Monitoring industry developments to ensure that curriculum design aligns with enterprise needs.

Enhancing the practicality and foresight of instruction through industry experience and school-enterprise collaboration.

3. Skill Development and Knowledge Transfer Capability

Teachers must not only impart theoretical knowledge but also facilitate the development of students' practical skills and abilities. Vocational education emphasizes "learning by doing," requiring teachers to support students in acquiring industry skills through practical training, laboratory work, and case-based instruction. Specific requirements include:

Designing practical courses that reinforce both theoretical knowledge and operational skills.

Proficiency in using training equipment and laboratory tools to guide students effectively.

4. Teacher Quality and Practical Instructional Capability

Practical instructional capability in vocational education requires teachers to integrate their instruction with enterprise needs, participate in industry placements, and enhance their expertise and teaching quality within their specialty.

Teachers are expected to engage in industry internships or technical training to deepen their understanding of industry practices.

Practical instruction should align with enterprise job requirements, offering students realistic simulations of workplace scenarios.

5. Capability for School-Enterprise Cooperation

School-enterprise cooperation is a vital aspect of vocational education, and teachers play a bridging role in facilitating this cooperation. Teachers need the capability to communicate and collaborate effectively with enterprises, which includes:

Coordinating curriculum development and project collaborations between the school and enterprises.

Inviting industry experts to participate in instruction and guide students during internships and job placements.

6. Teaching Innovation and Digital Instructional Capabilities

With advancements in educational technology, teachers must possess both teaching innovation and digital instructional capabilities to enhance teaching quality and student learning experiences. This includes:

Utilizing online platforms and virtual simulation labs for instruction.

Designing personalized learning pathways tailored to student needs to increase engagement and effectiveness.

7. Professional Ethics and Student Guidance Skills

Teachers are expected to instill professional ethics in students during instruction and provide career planning and job guidance. Teachers' professionalism is

reflected not only in their teaching practices but also in their behavior and adherence to professional ethics. This includes:

Assisting students in developing career plans and setting appropriate career goals.

Incorporating professional ethics into teaching to foster responsibility and teamwork among students.

In summary, teachers' professional skills encompass subject knowledge, adaptability to market demands, practical instructional capability, teaching innovation, and professional ethics, among other aspects. In vocational education, teachers need the ability to integrate theoretical knowledge with industry practices to ensure that students can adapt quickly to job roles and meet market needs upon graduation. These skills are not only indicative of teachers' instructional competence but also serve as the core assurance of vocational education quality. Enhancing teachers' professional skills is an essential pathway for advancing vocational education and a key objective of this study.

2.3.3 Current Status of Teachers' Professional Competency in Hubei Province

1. Analysis of the Current Situation

The teaching competency of vocational college teachers in Hubei Province plays a crucial role in promoting regional economic and social development. However, existing studies indicate that teachers still face challenges in areas such as practical instruction, the application of information technology, and curriculum design innovation. According to Li and et al. (2015), although vocational colleges in Hubei Province have made some contributions to regional economic development, teachers' teaching capabilities have not kept pace with industrial developments, particularly in training high-skilled personnel needed to meet economic demands.

An empirical analysis by Dabo (2023) found that the improvement of teaching competency among teachers in Hubei's vocational colleges directly impacts regional economic growth. Despite the positive influence of vocational education on regional development, teachers' insufficient competencies, particularly in teaching

quality and practical training guidance, often result in students lacking the necessary skills to meet enterprise demands. Data shows that the employability of vocational college graduates in Hubei Province is constrained by teachers' limited practical teaching skills, especially in technical courses where the lack of industry experience hinders teachers from providing effective skill guidance.

Additionally, teachers' information technology skills are critical for modern teaching effectiveness. Zeng and et al. (2023) studied the information technology capabilities of teachers in applied vocational colleges in Hubei Province, finding that many teachers were unable to effectively utilize IT tools, affecting classroom interactivity and limiting student engagement. The study highlighted the inadequacy of IT training for teachers in Hubei, making it difficult for them to fully leverage the advantages of digital educational environments.

In terms of curriculum design, Li (2023) investigated vocational colleges in Huanggang City and found that many teachers failed to align course development closely with regional economic needs, resulting in a disconnect between course content and industry practice. This issue not only manifests in outdated course designs but also reflects teachers’ limited understanding of cutting-edge industry technologies. Peng and et al. (2024) emphasized that vocational college teachers show deficiencies in teaching innovation, relying heavily on traditional lecture-based methods and lacking practical and innovative instructional approaches, which hampers students’ development of innovation and problem-solving skills. Moreover, Zhou (2023) found that in the field of art education management, vocational teachers in Hubei face limitations, particularly in providing practical guidance due to insufficient industry experience, which impedes students' hands-on skills development. The study further pointed out that while teachers in Hubei's art-related programs are relatively strong in theoretical instruction, they lack practical teaching and innovation skills, highlighting the urgent need for improvement.

2. Sources of the Issues

The sources of the deficiencies in teaching competency among vocational college teachers in Hubei Province can be summarized as follows:

Firstly, structural issues within the teaching workforce are particularly prominent. Dabo (2023) mentioned that most teachers in Hubei's vocational colleges lack sufficient industry experience, especially in technical courses where limited enterprise work experience makes it challenging for teachers to incorporate the latest industry trends and real-world scenarios into classroom teaching. This issue is especially evident in vocational education, directly affecting students' skill acquisition and their adaptability to employment.

Secondly, the inadequacy of the teacher training system is another critical factor contributing to insufficient teaching competency. Peng and et al. (2024) pointed out that although some progress has been made in teacher training, the focus remains on theoretical knowledge, while training in practical skills and innovative teaching methods is relatively weak. Current training programs often neglect deep collaboration with enterprises, and teachers lack opportunities to gain first-hand industry experience, making it difficult for them to provide students with the latest industry knowledge and technologies (Zeng & et al., 2023). Additionally, the systematic cultivation of teachers' innovative teaching capabilities is lacking, leading to a monotonous and uninspired approach to instruction.

Furthermore, deficiencies in school-enterprise cooperation, as well as policy and management issues, also contribute to inadequate teaching competencies. Chen and et al. (2023) stressed that school-enterprise cooperation is an essential avenue for enhancing teaching competency in vocational colleges, yet many institutions in Hubei Province have not established effective collaboration mechanisms. The lack of effective communication between teachers and enterprises prevents teachers from acquiring up-to-date technological knowledge, impacting curriculum design and practical teaching outcomes. Li (2023) further pointed out that weak ties between teachers and enterprises result in a misalignment between course design and market needs, leaving student learning content out of sync with actual job requirements, especially in technology-intensive industries. Zhang (2023) highlighted that although policies have been implemented to improve teaching competencies during vocational

education reform in Hubei, issues in policy execution persist, particularly in the evaluation and incentive mechanisms for teachers. Current policies do not comprehensively address practical teaching capabilities and innovative instructional methods, leading to a lack of motivation among teachers to enhance their practical teaching skills. Furthermore, insufficient incentives for teaching innovation also limit the diversity of curriculum design and instructional methods.

Lastly, the lack of information technology capabilities is rooted in insufficient resource investment. Zeng and et al. (2023) noted that although vocational colleges in Hubei have increased investments in IT teaching equipment in recent years, many teachers have not received systematic IT training, resulting in the ineffective application of digital teaching methods. This deficiency prevents teachers from fully utilizing modern teaching tools, negatively affecting teaching outcomes and classroom interaction.

2.3.4 Key Components of Teachers' Professional Skills

The enhancement of teachers' professional skills is a crucial area of vocational education research, particularly regarding how to develop a comprehensive teacher development system through capabilities such as market demand adaptation, knowledge and skill development, practical teaching, school-enterprise cooperation, and teaching innovation. This section reviews relevant studies to summarize the key components of teachers' professional skills and their impact on teaching quality.

1. Market Demand Adaptation Capability

Market demand adaptation refers to the ability of teachers to dynamically adjust curriculum content based on industry and enterprise trends. This skill is particularly important in vocational education, as its goal is to cultivate technically skilled talent that meets market needs. Xinming (2023) emphasized that teachers' participation in industry training and practical experience enhances their sensitivity to market demands and increases the practicality of the curriculum. Berniak-Woźny and et al. (2023) pointed out that regularly updating teaching content and incorporating new technologies can improve students' employability and workplace adaptability.

2. Knowledge and Skill Development Capability

Knowledge and skill development capability is the ability of teachers to balance theory and practice in instruction, cultivating students' comprehensive abilities. Sahudin (2022) mentioned that in vocational education, the integration of learning and doing is the core concept, requiring teachers to design case-based instruction, practical training courses, and skill competitions to develop students' hands-on skills. Research also shows that teachers can optimize instructional content based on student feedback, aiding in student development and academic progress.

3. Teacher Quality and Practical Instruction Capability

Practical instruction capability is the ability of teachers to integrate classroom instruction with industry needs. Research indicates that teachers participating in enterprise internships or short-term training programs can improve their practical teaching levels. Hazrat and et al. (2023)highlighted that industry practice enables teachers to better understand industry demands and incorporate real-world cases into instruction, helping students acquire practical skills. Additionally, establishing teacher evaluation systems encourages continuous improvement in practical skills.

4. School-Enterprise Cooperation Capability

School-enterprise cooperation capability refers to the communication and coordination skills required for teachers to facilitate collaboration between schools and enterprises. Bian and Wang (2021) emphasized that school-enterprise cooperation not only provides students with practical opportunities but also exposes teachers to the latest technologies in the industry. Teachers need to collaborate with enterprises to develop courses and organize student internships and practical activities, ensuring curriculum design matches job requirements.

5. Teaching Innovation Capability

Teaching innovation capability refers to the ability of teachers to design diverse teaching methods based on instructional goals and student characteristics. Research shows that with the advancement of information technology, online teaching platforms and virtual simulation labs have become essential tools for

teaching innovation (Xinming, 2023). Wagino and et al. (2024) further noted that innovative instruction enhances classroom interaction and boosts student engagement and learning outcomes.

In summary, the key components of teachers' professional skills—market demand adaptation, knowledge and skill development, practical instruction capability, school-enterprise cooperation, and teaching innovation—are widely recognized by scholars in the field of teacher competency research. These skills interact to collectively influence the teaching quality and employability of students in vocational education. By participating in industry practice, school-enterprise cooperation, and teaching innovation, teachers can continuously improve their professional skills, providing high-quality teaching and practical support to students. This study will integrate the insights from this literature review to design a systematic training program for teachers in vocational colleges in Hubei Province, exploring how the development of these core skills can drive the advancement of vocational education.

2.3.5 Current Status and Issues in School-Enterprise Cooperation in Vocational Colleges in Hubei Province

In recent years, vocational colleges in Hubei Province have made significant efforts to promote school-enterprise cooperation, aiming to achieve deep integration between industry and education through the modern industrial college model. However, numerous challenges in the implementation process have hindered the improvement of vocational education quality and the alignment of talent supply and demand in the regional economy. Below is a review of studies by scholars that examine the current status and challenges of school-enterprise cooperation in vocational colleges in Hubei Province from various perspectives.

J. Chen (2024) noted that while modern industrial colleges serve as an important pathway for promoting school-enterprise cooperation in Hubei's vocational institutions and have achieved certain successes, they have not yet reached the anticipated level of deep integration. Although several modern industrial colleges have been established in the province in recent years, and considerable efforts have been

made in curriculum development and the construction of practical training bases, the lack of effective collaboration mechanisms among multiple stakeholders has hindered the establishment of a stable governance model for school-enterprise cooperation. This deficiency has made it difficult for schools and enterprises to effectively integrate resources, thus affecting the development of students' practical skills and innovative capabilities.

Zhang and Wang (2021) further analyzed the issues in school-enterprise cooperation within Hubei's vocational colleges, particularly focusing on the low level of enterprise participation. They found that many enterprises lack long-term incentive mechanisms when engaging in cooperation, which discourages them from investing sufficient resources and effort. Since vocational colleges cannot offer enterprises immediate economic returns, especially small and medium-sized enterprises show limited interest in cooperation projects. This low participation rate not only affects the sustainability of school-enterprise cooperation projects but also limits students' opportunities to gain real work experience during practical training. Therefore, Zhang and Wang (2021) suggest enhancing enterprise participation through policy support and benefit-sharing mechanisms.

Zhao (2024) conducted a study on the alignment between vocational college programs and regional industrial clusters in Yichang, Hubei Province. Using a coupling coordination model, she analyzed the match between vocational college programs and industry needs, revealing that the current curriculum design does not sufficiently respond to the development needs of emerging industries, such as intelligent manufacturing and internet technology. This mismatch makes it difficult for graduates to quickly adapt to market demands, thus affecting the effectiveness of school-enterprise cooperation. Zhao proposed that, to improve the adaptability of vocational institutions, policy guidance and curriculum adjustments should be implemented to better align with industry needs, ensuring that students acquire skills aligned with future employment requirements during their studies.

Cai and Liu (2024) proposed optimization strategies for aligning vocational education with the industrial structure in Hubei Province and conducted an empirical analysis. They found that introducing industry mentors and increasing applied skill courses could effectively enhance graduates' employment quality and job alignment. For instance, their study showed that after implementing these strategies, the employment rate of graduates from vocational colleges in Hubei increased from 69.4% to 88.5%, demonstrating the significant impact of integrating enterprise resources and strengthening joint training programs on improving employment outcomes. They emphasized the importance of deep cooperation between schools and enterprises, as well as the necessity of further optimizing the school-enterprise cooperation mechanisms.

Z. Chen (2024) also highlighted that the lack of practical experience among teachers is a significant factor limiting the effectiveness of school-enterprise cooperation in Hubei's vocational institutions. The study showed that teachers have limited opportunities to participate in enterprise projects and industry research, directly impacting teaching quality and the development of students' practical skills. To address this issue, Z. Chen (2024) recommended that schools increase teacher training efforts, particularly by providing more opportunities for teachers to engage in enterprise practice and project development, thus enhancing their industry experience and research capabilities to better support school-enterprise cooperation.

Peng and et al. (2024) noted that the role of vocational education in talent development in the Hubei region is hindered by insufficient societal recognition of vocational education. Many enterprises do not value vocational education, resulting in limited investment and support for school-enterprise cooperation initiatives. They emphasized the need for policy guidance and incentive mechanisms to increase enterprises' recognition and participation in vocational education, thereby promoting deeper integration between education and industry.

Wang and Nie (2019) revealed a lack of alignment between the program clusters of private colleges in Hubei Province and regional industrial clusters. When

developing program clusters, vocational institutions have not sufficiently considered the actual needs of regional industries, leading to a disconnect between curriculum design and market demands, which, in turn, limits students' competitiveness in the job market. They suggested adjusting program clusters to better align with the realities of regional industries and improving course content through strengthened cooperation with enterprises to enhance the effectiveness of school-enterprise cooperation.

In summary, vocational colleges in Hubei Province face several challenges in school-enterprise cooperation, including low enterprise participation enthusiasm, poor alignment between program offerings and industry needs, insufficient practical experience among teachers, and limited societal recognition of vocational education. These challenges impact the quality of vocational education and the employability of students. Therefore, strengthening policy support, optimizing teacher training, enhancing incentive mechanisms for enterprise participation, and increasing societal awareness of vocational education are crucial steps for advancing vocational education in Hubei and achieving deeper integration between vocational colleges and the regional economy.

2.4 Design and Implementation of Teacher Training Programs

Designing and implementing scientifically sound teacher training programs is an essential strategy for enhancing teachers' instructional competencies, particularly in vocational education where practical skills and technological adaptation are critical. In the current era of digital transformation, the teaching landscape is rapidly evolving, requiring educators not only to master their subject knowledge but also to stay abreast of new technological developments and innovative teaching methods that can engage students effectively and meet the demands of modern industries (Cao & et al., 2023). This shift emphasizes the need for comprehensive teacher training programs that are dynamic, multi-faceted, and responsive to the changing educational environment.

To effectively support teachers in adapting to these challenges, teacher training programs should be structured to encompass multiple dimensions. First, the updating of

professional knowledge is crucial. Teachers need to continuously update their knowledge base to stay current with the latest developments in their respective fields. This is particularly important in vocational education, where industry practices and technologies evolve rapidly. Training programs should provide teachers with access to the latest research, industry updates, and professional networks to ensure that their instructional content is relevant and up-to-date.

Second, the enhancement of practical skills is indispensable. In vocational education, the practical application of knowledge is as important as the theoretical understanding. Many vocational college teachers, while proficient in theoretical concepts, may lack the hands-on skills required to demonstrate and teach practical applications effectively. Therefore, training programs should include modules specifically designed for practice-oriented training, enabling teachers to engage in hands-on experiences. By simulating real-world scenarios and utilizing state-of-the-art training facilities, teachers can develop the skills needed to perform and teach practical tasks effectively. For example, skill-based workshops, laboratory sessions, and industry visits are effective methods for teachers to gain firsthand experience, which they can then translate into their classroom practices.

He and Jen (2025) proposed utilizing vocational college skills competitions as a strategic method for enhancing teachers' instructional competencies. Such competitions serve multiple purposes: they foster teaching innovation, create opportunities for professional reflection, and highlight areas for improvement in instructional methods. These competitions also allow teachers to engage in peer learning and knowledge exchange, further strengthening their professional network and collaborative skills. Additionally, the feedback obtained from these events provides valuable insights into areas that need further development, enabling educators to refine their instructional strategies.

In addition to these traditional approaches, integrating digital tools and training programs specifically designed for vocational education is crucial in the current technological era. For instance, platforms such as Moodle and Edmodo support

teachers in designing interactive online lessons, managing student progress, and fostering blended learning environments. Tools like 3D CAD software, VR-based welding simulators, and virtual machine tool operation systems are increasingly used to replicate complex industrial scenarios in a safe and accessible manner, allowing teachers to build both their technical and pedagogical capabilities. These technologies have been proven effective in vocational settings where hands-on skill development is essential. Furthermore, national initiatives such as China's "National Vocational College Information-Based Teaching Competition" and regional smart classroom training programs have demonstrated success in improving teachers' digital literacy and instructional design competencies (C. Zhang, 2024). Internationally, programs like Germany's "DigitalPakt Schule" and Singapore's SkillsFuture for Educators provide valuable references for large-scale professional development that emphasizes technology integration.

Moreover, the aspect of personalization and flexibility in teacher training programs cannot be overstated. Mireles-Rios and et al. (2019) emphasized that training programs should be tailored to meet the specific needs of individual teachers, recognizing that one-size-fits-all solutions are often insufficient in addressing diverse learning needs and professional backgrounds. The customization of training programs enables teachers to receive instruction that is relevant to their stage in the teaching career and their specific teaching responsibilities. For instance, newly recruited young teachers should receive training that focuses on fundamental instructional techniques, such as lesson planning, classroom management, and student engagement strategies. These foundational skills are critical for building confidence and competence in the early stages of their teaching careers.

Conversely, for experienced teachers, the focus should shift towards the integration of advanced information technology tools, the use of data analytics in education, and the implementation of innovative teaching strategies that can transform traditional classroom settings into interactive and immersive learning environments. Professional development workshops on emerging technologies such as augmented

and virtual reality (AR/VR), AI-assisted teaching tools, and virtual labs can help teachers enhance student engagement and prepare them for future industry practices (M. Zhang, 2024).

To maximize the effectiveness of these training programs, the implementation process should be designed to incorporate diverse instructional methods, thereby catering to different learning preferences and schedules. For example, programs can utilize online learning platforms, which offer flexibility in scheduling, enabling teachers to learn at their own pace and convenience. This approach is particularly beneficial for teachers who are balancing teaching responsibilities with professional development. Blended learning models, combining online coursework with face-to-face training sessions, allow for interactive learning experiences and immediate application of new knowledge in a supportive environment. Field visits and industry placements are also critical components, giving teachers direct exposure to industry practices and standards. Such hands-on experiences can provide educators with a practical understanding of industry needs, which they can then integrate into their curriculum planning and delivery.

M. Zhang (2024) advocated for the integration of digital tools like virtual simulation technologies and interactive e-learning platforms in teacher training programs. These tools allow teachers to engage in simulated classroom environments where they can practice delivering lessons and managing classroom dynamics. Such digital training not only develops teachers' competencies in information technology-based teaching but also offers a convenient and accessible mode of learning that accommodates their busy schedules. Virtual simulations, in particular, create a safe space for teachers to experiment with new teaching techniques and refine their methods before applying them in real classrooms, thereby building confidence and proficiency.

The successful implementation of teacher training programs, however, relies heavily on robust support mechanisms. School management and educational leaders must play an active role in ensuring that teachers have sufficient opportunities to participate in training programs. This support includes establishing incentive

mechanisms that motivate teachers to engage in continuous professional development. Rusman (2020) highlighted that effective teacher leadership and strong management support are crucial for the success of training programs. Schools should not only provide these opportunities but also create a reward and recognition system that acknowledges teachers' efforts and achievements. Incentives may include promotions, certifications, financial rewards, and professional recognition, all of which can serve as motivational tools for teachers to actively enhance their skills and translate training outcomes into improved instructional practices.

Lastly, it is essential for teacher training programs to undergo regular evaluation and assessment to ensure they are effective and relevant. Continuous evaluation allows for the monitoring of improvements in teachers' instructional methods, enabling trainers to identify which elements of the program are most successful and which areas require enhancement. Schools can gather data through a combination of student feedback, peer evaluations, and self-assessment tools to comprehensively assess the impact of training on teaching performance. Evaluating the effectiveness of training programs is also an opportunity to collect insights on emerging needs and trends in education, ensuring that the training content remains aligned with the evolving demands of the educational sector. Dabo (2023) emphasized that by analyzing these assessments, training programs can be refined and optimized, creating a cycle of continuous improvement that not only enhances teacher performance but also contributes to the overall quality of vocational education.

In conclusion, designing and implementing effective teacher training programs is a multifaceted process that requires attention to the evolving needs of the education sector and the professional development requirements of teachers. By integrating digital tools, innovative training platforms, and industry-relevant professional development programs, vocational institutions can establish comprehensive systems that effectively build teachers' competencies, ensuring high-quality vocational education and better alignment with modern industry demands.

2.5 Overview of Teacher Development Models

2.5.1 PDCA Cycle Theory and Its Application in Teacher Development

The PDCA (Plan-Do-Check-Act) cycle theory, proposed by Deming (1986), was initially applied in quality management. In recent years, scholars have extended its use to the educational field to improve teaching quality and teacher training(Samuel & Farrer, 2025). The core of this theory lies in its iterative cycle, continuously optimizing the teaching process to enhance teachers' instructional skills and students' learning outcomes(Ren & et al., 2024). The PDCA cycle consists of four stages: Plan, Do, Check, and Act, each providing specific roles and guidance that offer an effective framework for teachers to reflect on and improve their instructional practices.

1. Plan Stage

In the “Plan” stage, teachers set clear instructional objectives and develop detailed lesson plans. This stage emphasizes a comprehensive analysis of teaching content, methods, and student needs (Samuel & Farrer, 2025). For instance, Ren and et al. (2024) noted that when designing a lesson plan, teachers should consider students' abilities and course requirements to ensure that the content aligns with students' needs. Additionally, Chen and et al. (2024) highlighted that curriculum planning should reflect the latest industry developments and demands, especially in vocational education, where lesson plans should align with industry standards and practical needs.

Furthermore, this stage requires teachers to establish detailed expectations for achieving instructional objectives. Wigomwayagon and Vanno (2021) demonstrated that setting clear and measurable objectives allows teachers to effectively evaluate course effectiveness and provides a foundation for future evaluations and adjustments. Their study found that curriculum design, especially in practice-based courses developed in collaboration with enterprises, often necessitates setting specific skill development and operational standards to ensure students acquire industry-relevant skills.

2. Do Stage

The “Do” stage is crucial for putting the plan into practice. During this stage, teachers implement the planned lesson and observe student reactions (He, 2024). Samuel and Farrer (2025) emphasized that this stage is not only about knowledge delivery but also an opportunity for teachers to engage with students through classroom interaction, observe their responses, and gather feedback for improvement. Practical teaching is particularly vital in vocational education, where teachers use hands-on activities and demonstrations to help students understand and apply knowledge.

Ren and et al. (2024) explored the application of the PDCA theory in developing programming skills and noted that classroom management and instructional flexibility are essential in the “Do” stage. In vocational education, this stage also includes teachers providing hands-on guidance, such as in mechanical engineering courses, where teachers demonstrate operational procedures and assist students with practical exercises. C. Zhang (2024) highlighted that student engagement and performance in practical activities are critical indicators for evaluating course effectiveness during this stage.

3. Check Stage

The “Check” stage is a critical step in evaluating the instructional process. whether instructional objectives have been met through student feedback, classroom observations, and test results (White & Maher, 2024). White and Maher (2024) emphasized that the focus of this stage is on data analysis and feedback mechanisms to identify instructional deficiencies and provide a foundation for further improvement.

In practice, Ezhou Vocational University uses student feedback data to evaluate instructional effectiveness, particularly regarding students' practical skills, which directly reflect the effectiveness of practical guidance (C. Zhang, 2024). Huan and Nasri (2022) highlighted that student feedback reveals weaknesses in instruction and helps teachers understand students’ needs and challenges through surveys and interviews. For example, in practical courses, students might struggle with tasks due to

improper operation, and such feedback helps teachers refine their methods in future classes (White & Maher, 2024).

4. Act Stage

In the “Act” stage, teachers implement corrective actions based on the findings from the “Check” stage to optimize subsequent instructional content and methods (Wigomwayagon & Vanno, 2021). This stage is crucial in the PDCA cycle, allowing teachers to adjust and enhance their instructional practices, thereby improving overall effectiveness.

L. Zhang (2024) demonstrated that by implementing improvements in the “Act” stage, teachers can redesign course structures, adjust the complexity of instructional content, and introduce more practical opportunities to enhance student learning. Huan and Nasri (2022)suggested that improvements in this stage should extend beyond adjusting course content to include optimizing instructional methods and evaluation approaches. For example, teachers can add more lab sessions or practical activities based on students’ progress to facilitate their understanding of course material(White & Maher, 2024).

Through this iterative process, the PDCA theory supports teachers in continuously reflecting, adjusting, and improving their instructional practices, forming a cycle of ongoing enhancement (L. Zhang, 2024). This model of continuous feedback and adjustment allows teachers to flexibly respond to classroom dynamics and further optimize strategies based on feedback and course outcomes (White & Maher, 2024).

2.5.2 Practical Value of School-Enterprise Cooperation in Teacher Development

School-enterprise cooperation is an indispensable model for advancing vocational education and teacher development. It provides teachers with resources and support for enhancing their practical skills, developing curricula, and innovating teaching methods through the integration of education with industry needs. Through school-enterprise cooperation, teachers can incorporate industry standards and technical demands into classroom instruction, facilitating the updating and optimization of instructional content(C. Zhang, 2024).

1. Enhancing Teachers' Practical Skills and Industry Knowledge

Industry Placements and Training: School-enterprise cooperation offers teachers opportunities for industry placements and short-term training, enabling them to gain insights into enterprise technologies and processes, staying updated with industry trends.

Industry Experts in Teaching: Enterprises send technical personnel as part-time instructors who co-teach with school faculty. This interaction allows teachers to quickly absorb applied knowledge and integrate it into their instruction (Antera, 2021).

Access to Real-World Cases and Projects: School-enterprise cooperation provides authentic cases and projects, allowing teachers to design case-based instruction and facilitate realistic simulations.

2. Optimizing Curriculum Design and Instructional Methods

Joint Course Development: Schools and enterprises collaborate to create market-oriented courses, ensuring the relevance of instructional content. Teachers' involvement in course development allows them to align content with industry needs accurately and update it promptly.

Project-Based Teaching and Practical Sessions: Teachers collaborate with enterprises to design project-based modules, guiding students through real projects or practical courses to enhance their skills. During this process, teachers refine their instructional methods (Zhang & Wang, 2021).

3. Improving Teachers' Market Adaptability and Teaching Innovation

Staying Current with Market Trends: School-enterprise cooperation exposes teachers to market dynamics, enabling them to adjust course content and improve adaptability.

Promoting Instructional Innovation: Teachers gain new technologies and tools, such as virtual simulations and online platforms, through enterprise cooperation. Incorporating these innovations enhances teaching effectiveness ((Zhang & Wang, 2021).

2.5.3 Theoretical and Model Framework Adopted in This Study

To effectively enhance the professional instructional competencies of vocational college teachers in Hubei Province, this study integrates the PDCA cycle theory and the school-enterprise cooperation model to develop a systematic framework suitable for teacher development (Triyono & et al., 2020). This framework aims to continually improve teachers' instructional and practical skills through iterative practice and feedback. Furthermore, the model aligns closely with the industrial characteristics of Hubei Province, ensuring that teacher development corresponds with the region's economic growth needs. The following sections provide a detailed explanation of the model's components and practical pathways.

2.5.3.1 Integration of the PDCA Cycle and School-Enterprise Cooperation Model

PDCA Cycle Theory

The PDCA (Plan-Do-Check-Act) cycle is a key tool in Total Quality Management (TQM) that emphasizes continuous improvement through a cycle of planning, executing, checking, and acting. In teacher development, the PDCA cycle supports systematic reflection on instructional practices and promotes ongoing optimization.

Plan: Develop teacher training programs based on course and student needs, clearly defining objectives and strategies.

Do: Teachers participate in training sessions, engage in enterprise practice, or implement courses to build instructional experience.

Check: Assess the outcomes of training and instructional performance using various methods, including student feedback, peer reviews, and enterprise evaluations.

Act: Adjust instructional strategies or training programs based on assessment results to further improve teaching competencies.

Value of the School-Enterprise Cooperation Model

The practical value of the school-enterprise cooperation model in teacher training lies in the integration of industry and education. Through close collaboration between schools and enterprises, teachers can engage in industry practices, update instructional content, and acquire the skills and standards required by the industry. Specific measures of this model include:

Industry Practice: Teachers participate in regular industry placements or technical training to gain the latest industry insights.

Joint Curriculum Development: Schools and enterprises collaborate to develop course content, ensuring that teaching aligns closely with job requirements.

Industry Experts in Instruction: Industry mentors serve as part-time instructors, collaborating with school faculty to help teachers understand practical operations within enterprises.

Integration Pathways of PDCA and School-Enterprise Cooperation Model

1. Plan Stage: Develop joint teacher training programs in collaboration with enterprises based on the region's economic development needs.

2. Do Stage: Teachers engage in enterprise practice and integrate real-world cases from enterprises into classroom instruction.

3. Check Stage: Evaluate teachers' performance and improvements in practical skills through feedback from enterprises and students.

4. Act Stage: Adjust teacher training content and instructional strategies based on feedback and iterate the cycle for continuous improvement.

2.5.3.2 Model Construction for Vocational Teacher Development in Hubei Province

The regional economic characteristics of Hubei Province provide a unique context for vocational teacher development. For instance, the growth of industries such as mechanical manufacturing, logistics management, and information technology requires a substantial number of highly skilled professionals. Therefore, the teacher development model constructed in this study focuses on integrating school-

enterprise cooperation with teacher competency enhancement, ensuring alignment with the regional economic needs.

Core Elements of the Model

1. Development of Training Plans: Schools and enterprises jointly develop annual teacher training plans, specifying objectives and content.

2. Enterprise Placement Practice: Teachers engage in enterprise practice to incorporate industry experience into course design.

3. Multi-Dimensional Evaluation and Improvement: Identify issues in instruction through student feedback, enterprise evaluations, and self-reflection, implementing necessary improvements.

4. Promotion of Digital and Innovative Instruction: Schools provide digital teaching training and resources to help teachers master modern instructional methods.

2.5.3.3 Logical Relationships and Practical Pathways of the Research Model

Logical Relationship: Key Pathway for Enhancing Teacher Competencies

The model in this study integrates the PDCA cycle and school-enterprise cooperation models to continually enhance teachers' instructional, practical, and innovative skills through a cycle of planning, practice, feedback, and improvement. The logical framework of this model is as follows:

1. Input (Market Demand and Industry Standards): The starting point of the model is an analysis of market demand and industry standards, determining the direction and objectives for teacher development.

2. Process (School-Enterprise Cooperation and PDCA Cycle): Teachers engage in projects, industry practice, and instructional innovation through school-enterprise cooperation, forming a cyclical process for enhancing practical skills and instructional competencies.

3. Output (Teacher Competency Enhancement and Instructional Quality Improvement): Through multiple PDCA cycles and school-enterprise

collaboration, teachers' professional competencies are continuously refined, and instructional content and methods are optimized.

4. Feedback (Multi-Level Evaluation): Students, enterprises, and schools collectively evaluate the effectiveness of teachers' instruction, using these evaluations as the basis for the next PDCA cycle.

Practical Pathway: Closed-Loop Management from Planning to Implementation

1. Plan Development: Schools and enterprises collaborate to design training plans based on market demands and the current competencies of teachers.

2. Training Implementation: Teachers participate in industry placements, school-enterprise projects, and instructional workshops to gain practical experience.

3. Evaluation and Feedback: Assessments of teachers' competency improvements are conducted through student evaluations, enterprise feedback, and self-reflection.

4. Adjustment and Improvement: Training plans and instructional content are refined based on evaluation results, forming a closed-loop management system.

This study integrates the PDCA cycle theory and school-enterprise cooperation models to construct a systematic framework tailored for developing vocational teachers in Hubei Province. The model emphasizes the continuous enhancement of teachers' instructional and practical skills through industry practice, curriculum development, and instructional innovation within the planning, implementation, evaluation, and improvement stages. The logical structure ensures that teacher competency development is aligned with regional economic growth through market-driven orientation and multi-level feedback. The practical pathway proposed in this study provides actionable guidance for teacher development, laying a solid

foundation for improving vocational education quality and advancing teachers' professional growth.

2.5.3.4 Strategies for Enhancing Teachers' Instructional Competencies

1. Enhancing Practical Instructional Competencies through School-Enterprise Cooperation

School-enterprise cooperation is a critical strategy for enhancing vocational college teachers' practical instructional skills, particularly in vocational education, where hands-on instruction is essential for developing core student competencies. Liang and Chen (2024) emphasized that vocational teachers must continually acquire the latest industry knowledge and skills, and school-enterprise cooperation provides a key platform for this. Through enterprise collaborations, teachers can participate in real-world projects and utilize enterprise resources to improve their practical teaching abilities.

Research by Peng and et al. (2024)highlighted that school-enterprise cooperation offers teachers opportunities to engage with authentic industry scenarios, enabling them to better understand enterprise needs and adjust instructional content based on the latest technologies and industry trends. For instance, successful experiences from vocational colleges in Dongguan demonstrate that teachers who participate in enterprise projects not only enhance their technical skills but also integrate industry requirements into course curricula, improving students' adaptability to professional environments.

School-enterprise cooperation can take various forms, including mentoring systems and the establishment of enterprise training bases. These methods allow industry experts to directly participate in vocational college instruction, collaborating with teachers to develop courses and design practice modules that meet industry standards (He, 2024). Dong and Qin (2023) studied the impact of school-enterprise cooperation in the context of "New Engineering" and noted that teachers in engineering programs gain valuable work experience through these collaborations,

effectively broadening and deepening their practical teaching, thus helping students acquire skills aligned with industry developments.

Additionally, enterprises can provide internship opportunities and project collaborations that benefit both teachers and students. Zhang and Wang (2021) emphasized that when teachers participate in enterprise practices, they not only enhance their professional skills but also gain deeper insights into industry technologies, enabling them to offer more specialized practical guidance to students. Some vocational colleges have established long-term cooperation mechanisms with enterprises, allowing teachers to regularly engage in technical training and directly apply acquired knowledge in their teaching, thereby improving students' employability.

Overall, school-enterprise cooperation serves as a bridge in vocational education, enabling teachers to effectively enhance their practical instructional competencies. This collaboration ensures that teachers continuously update their technical skills and innovate in teaching methods and curriculum design, aligning vocational education with market demands (Rusman, 2020).

2.6 School enterprise cooperation

2.6.1 Functional Role of School-Enterprise Cooperation in Vocational Education

School-enterprise cooperation (SEC) plays a strategic role in China's modern higher vocational education system. In the context of 5G development and industrial transformation, SEC serves as a crucial mechanism connecting education with labor market needs. It not only enhances the training pathways for technical and skilled talent but also provides institutional support for improving the responsiveness and quality of vocational education.

First, SEC strengthens the employment-oriented nature of vocational programs. By integrating real-world enterprise resources into curricula, students gain hands-on experience and occupational competencies that directly align with job requirements. Studies have shown that such integration leads to a notable increase in graduate employment rates—up to 11.35% higher than in traditional programs—and

employers report greater satisfaction with graduates trained under cooperative models (Guo, 2023). This synergy motivates sustained enterprise involvement and fosters a positive feedback loop for educational quality.

Second, SEC enables shared value creation between institutions and industries. Enterprises increasingly participate in curriculum development, standards formulation, and teaching delivery. Zhou and Xu (2023) highlight that recent policy reforms in China have accelerated this shift toward co-governance, encouraging schools and enterprises to jointly shape vocational education systems. This collaboration enhances curriculum relevance and strengthens the role of vocational institutions in serving local economic development.

Moreover, SEC facilitates the implementation of national education reforms and supports systemic innovation. Policy documents such as the National Vocational Education Reform Implementation Plan and the Measures for Promoting School-Enterprise Cooperation emphasize the need for practice-oriented teaching, dual-qualified faculty, and extended enterprise placements (Deng & Rattanasiraprapha, 2025). SEC is thus not only a pedagogical tool but also a policy instrument for aligning education with strategic national goals.

Finally, SEC helps bridge the gap between talent supply and industrial demand. By involving enterprises in co-designing curricula and delivering instruction, vocational colleges can ensure that their programs remain current and demand-driven (Naylor & et al., 2022). This makes SEC a key driver for aligning education with technological progress and labor market shifts.

In summary, SEC has evolved from a peripheral support mechanism into a core component of vocational education reform. In the digital age, especially with the rise of 5G and AI, it represents a foundation for quality improvement, strategic alignment, and economic relevance in China's vocational training system.

2.6.2 Challenges for Deepening Cooperation

Despite the continuous advancement of school-enterprise cooperation in China's vocational education sector, significant structural challenges remain that hinder

the depth and sustainability of such partnerships. These challenges are not limited to superficial collaboration forms, but rather stem from issues embedded in institutional frameworks, resource alignment, and the dynamics between educational institutions and industry partners.

First, the current regulatory and institutional systems supporting school-enterprise cooperation remain fragmented and underdeveloped. While national policies—such as the "Opinions on Deepening Industry-Education Integration"—have outlined strategic goals, local implementation often lacks consistency and actionable frameworks. This policy fragmentation results in limited guidance for vocational colleges and enterprises attempting to establish sustainable cooperation (Zhang & Wang, 2021).

Second, asymmetrical motivations between educational institutions and enterprises compromise the depth of collaboration. Vocational colleges are often driven by objectives such as improving graduate employment rates and fulfilling “work-integrated learning” mandates, while enterprises prioritize short-term economic gains. When industry partners perceive limited immediate returns or face risks related to intellectual property or resource commitment, their willingness to engage in deeper, long-term partnerships diminishes (Qin & Lei, 2024).

Third, many existing collaborations are project-based and lack continuity. Partnerships initiated through government funding or short-term institutional efforts often struggle to establish mechanisms for ongoing curriculum co-development, talent exchange, or evaluation. As a result, these fragmented collaborations fail to create enduring impact on students’ practical competencies or employers’ trust (Liang & Chen, 2024).

Moreover, structural mismatches persist between educational offerings and labor market needs. Many vocational programs remain anchored in outdated disciplinary frameworks, disconnected from evolving industry competency models. Concurrently, enterprises are rarely involved in the design or assessment of educational content, leading to misalignment between training outcomes and workplace requirements(He, 2024; Qin & Lei, 2024).

Another key limitation lies in the absence of effective collaborative platforms. Most vocational colleges and enterprises lack intermediary institutions that facilitate communication, negotiate shared goals, and ensure quality standards. Without standardized mechanisms for collaboration, many joint initiatives rely heavily on informal personal networks or ad-hoc arrangements, reducing scalability and replicability (J. Chen, 2024).

Finally, the scope of cooperation remains narrow. Predominantly centered around internship programs or “order-based” training, current models rarely extend into joint curriculum development, R&D collaboration, or shared governance structures. In many cases, enterprises do not take proactive roles in shaping educational strategies or nurturing long-term professional pipelines, which undermines their responsibility in talent co-creation(Liu & et al., 2024).

To advance school-enterprise cooperation beyond superficial engagement, a comprehensive ecosystem must be established—one that includes regulatory clarity, mutual benefit mechanisms, curriculum alignment with occupational standards, and third-party coordination. Only through trust-based, mutually reinforcing partnerships can vocational education effectively respond to industry needs while elevating the practical skills and employability of students.

2.7 Related Studies

The professional instructional competencies of vocational college teachers are central to the effectiveness of vocational education, particularly in regions like Hubei Province, where aligning education with regional economic development is a strategic imperative. A growing body of literature has examined how various factors—including teacher training, school-enterprise cooperation, digital technology, policy support, and instructional innovation—can jointly support the cultivation of competent vocational educators. This section synthesizes key findings across five relevant thematic areas.

1. Teacher Training and Professional Development

Professional development is widely acknowledged as a key mechanism for enhancing vocational teachers’ instructional capacities. Zhuang and et al. (2022)

highlighted that factors such as skill-based incentives, academic advancement, and participation in enterprise-based training significantly influence teacher development. Structured training programs that combine pedagogical and technical dimensions have been found to yield sustained improvement in teaching quality (Zhuang & et al., 2022). Similar findings emerged in cross-national research by Triyono and et al. (2020), which emphasized the role of personalized development plans in improving instructional design and teaching strategies. These findings suggest that vocational teachers benefit most from development pathways that integrate structured feedback, peer support, and reflective practices(Triyono & et al., 2020).

Additionally, Lertlam and et al. (2024) developed a professional development program targeting railway systems teachers in Thailand. The program successfully integrated industry practices into pedagogy, demonstrating that industry-aligned training enhances not only teaching capabilities but also students' workplace readiness (Lertlam & et al., 2024). Amponsah and et al. (2023) emphasized that effective teacher development also depends on intrinsic motivation and access to institutional support, including mentoring and leadership pathways.

2. Integration of Information Technology

Digital transformation is reshaping vocational education, and the integration of IT tools is increasingly viewed as a driver of pedagogical innovation. Diao and Yang (2021) proposed a comprehensive evaluation framework that leverages virtual simulations, online learning platforms, and data analytics to enhance teaching performance. These digital strategies allow vocational teachers to simulate workplace environments and provide differentiated instruction (Diao & Yang, 2021). Tan and Du (2022)further demonstrated how big data applications enhance entrepreneurship education in vocational settings, showing improved student engagement and teaching efficacy.

3. School-Enterprise Cooperation

School-enterprise cooperation is widely regarded as a cornerstone of high-quality vocational education. Such cooperation not only aligns curricula with labor

market demands but also provides teachers with first-hand experience of evolving industry standards. Na (2024) argued that meaningful collaboration with enterprises is essential for enhancing the practical dimension of teaching. Teachers benefit by participating in joint curriculum development, on-site internships, and industry mentorship programs(Na, 2024).

In the context of Hubei Province, Dabo (2023) emphasized that deepening school-enterprise cooperation is pivotal to addressing skills mismatches in the regional economy. He advocated for mechanisms that enable teachers to engage in ongoing dialogue with industry partners, thereby ensuring that instruction remains relevant and forward-looking.

4. Innovative Instructional Strategies

The changing landscape of industry calls for instructional innovation in vocational education. Lewis (2025) underscored the importance of integrating emerging technologies, such as blended learning and virtual labs, into teaching practices. These innovations enable teachers to deliver more engaging and personalized instruction (Lewis, 2025). Wahyuni and Sugihartini (2021)found that significant skill gaps among vocational school teachers could be narrowed through structured, innovation-focused training programs. Such programs support teachers in adopting learner-centered approaches that are responsive to diverse learning needs (Wahyuni & Sugihartini, 2021).

5. Policy Support and Regional Development

Finally, supportive policy environments are indispensable for enhancing teacher quality. Li (2023) in a case study of Huanggang City, Hubei, emphasized that aligning vocational education policies with regional development goals contributes to teacher motivation and institutional accountability. Peng and et al. (2024) reinforced this view, suggesting that region-specific policy support—such as funding incentives, curriculum reform frameworks, and performance-based evaluation—can accelerate the professionalization of the teaching workforce(Peng & et al., 2024).

Collectively, the literature underscores the need for a multi-pronged approach to improving vocational teachers' instructional competencies. While promising models exist, challenges remain in areas such as the sustainability of school-enterprise partnerships and the integration of digital tools into everyday instruction. Moreover, the practical implementation of national policy frameworks—such as the Twenty Basic Guidelines for Vocational Education—requires further empirical validation. This study, therefore, builds on existing evidence to propose a comprehensive strategy for enhancing the instructional capacity of vocational educators in Hubei, with particular attention to professional development, enterprise engagement, digital competence, and institutional support.

CHAPTER 3
RESEARCH METHODOLOGY

This chapter outlines the research design and methodological approach adopted in the study. It provides the rationale for employing a mixed-methods framework, integrating both quantitative (questionnaire) and qualitative (interview) tools. The chapter describes the selection of participants, research instruments, data collection procedures, and ethical considerations. By clarifying the research process, this chapter enhances the transparency, reliability, and validity of the findings presented in the subsequent sections.

Research Design

This study adopts a mixed-methods approach, integrating both quantitative and qualitative analyses to investigate effective strategies for enhancing the professional teaching competencies of faculty members at Ezhou Vocational University. Specifically, it examines how national policy frameworks—particularly The Twenty Basic Guidelines for Vocational Education—and market-driven demands influence instructional capacity and pedagogical outcomes within the context of school-enterprise cooperation.

Data collection comprises two primary methods. First, a structured Likert-scale questionnaire serves as the main quantitative instrument. It includes items that assess dimensions of teaching competency, awareness of national vocational policies, and attitudes toward enterprise collaboration. Respondents evaluate each statement based on their personal teaching experience. This method facilitates the systematic identification of faculty perspectives on competency development, training needs, and policy relevance.

Second, semi-structured interviews are conducted with a purposive sample of instructors to capture insights that are not easily quantifiable. These interviews explore how school-enterprise cooperation has impacted teaching practices, instructors' interpretations of The Twenty Guidelines, and perceived institutional barriers to

implementing competency-based instruction. The open-ended format enables in-depth exploration of personal, institutional, and systemic influences on professional growth.

Data analysis combines both strands. Quantitative data will be tabulated and analyzed to identify trends in faculty development needs and their alignment with vocational education policy and enterprise expectations. Interview transcripts will be examined using thematic analysis to extract recurring patterns related to instructional challenges, policy integration, and collaborative engagement with industry. Additionally, the study will consider how improvements in teaching competency influence student skill acquisition and academic performance.

By synthesizing findings from both data sources, this research seeks to provide a comprehensive, evidence-based understanding of how to strengthen vocational teaching practices in alignment with national education policy and the evolving needs of industry partners.

Participants

The institution under study in this research is Ezhou Vocational University in Hubei Province, with plans to conduct a survey of its teaching staff during the 2025 academic year. The study population will include all full-time teaching staff at the university, with an expected total of 45 teaching staff members.

Table 2 3.1 Number of Teaching Staff at the School of Engineering, Ezhou Vocational University, Hubei Province

Institution Name	Number of Teaching Staff
Ezhou Vocational University, Hubei Province	45
Total	45

The target institution for this study is Ezhou Vocational University in Hubei Province, where a survey of its full-time faculty members is planned for the 2025 academic year. The participants will include all full-time faculty members at the university, with a total of 45 participants expected. All participants are officially employed full-time by the university and possess similar academic backgrounds and work experience. All participants are full-time faculty members from the School of Engineering, with comparable teaching experience and educational qualifications. To ensure the sample's representativeness, all teachers were voluntarily recruited to participate in this study.

The sample of faculty members in this study is categorized based on years of teaching experience as follows:

1. Junior teachers (1-5 years);
2. Mid-level teachers (6-15 years);
3. Senior teachers (over 16 years).

The distribution is shown below:

Table 3 3.2 Faculty Grouping at the School of Engineering, Ezhou Vocational University, Hubei Province

Faculty Group	Number of Teachers
Junior Teachers (1-5 years)	15
Mid-level Teachers (6-15 years)	25
Senior Teachers (over 16 years)	5

Table 3 (Continued)

Faculty Group	Number of Teachers
Total	45

All participants agreed to complete a self-assessment questionnaire, which was designed to collect relevant data on teachers' professional teaching competencies. All questionnaire data were processed anonymously and kept strictly confidential.

Furthermore, according to the relevant literature, qualitative research typically selects 12 to 30 participants as the sample size, which ensures data richness while avoiding data overload caused by an excessively large sample. Given the precise target population of this study, 12 teachers were randomly selected from each group for one-on-one semi-structured interviews. These interviews aimed to further explore teachers' actual experiences and challenges in the process of improving their teaching competencies. The selection of the interview sample followed a simple random sampling principle to ensure the representativeness of teachers from each group. Therefore, the interview sample size in this study meets the standard, and the researcher believes this sample size is sufficient to achieve data saturation.

Research Instruments

The instruments employed in this study are outlined below:

Part 1: Questionnaire

This study aims to assess the professional teaching competencies of faculty members at Ezhou Vocational University in Hubei Province, with a particular focus on how these competencies align with the practical talent demands of enterprises involved in school-enterprise cooperation. The assessment emphasizes key areas such as curriculum relevance to industry needs, practical teaching integration, enterprise collaboration, pedagogical adaptability, and student employability support. To achieve

this, a comprehensive set of measurement tools was designed, primarily consisting of the Professional Teaching Competence Scale. These tools are intended to provide a quantitative assessment of teachers' competencies within the context of industry-linked teaching practices and to analyze key factors influencing the enhancement of their abilities to meet enterprise-aligned instructional goals.

All measurement tools utilize a Likert five-point scale, with respondents selecting options ranging from "strongly disagree" to "strongly agree," with scores ranging from 1 to 5.

Part 1: Demographic Variables

The first section of the questionnaire aims to collect basic demographic information from the participating teachers, including gender, age, academic title, years of teaching experience, and educational background. This information will allow the study to analyze the level of participation and potential differences in professional development among teachers from varying backgrounds.

Part 2: Professional Teaching Competence Scale

The primary instrument in this study is the Professional Teaching Competence Scale. This scale evaluates teachers' instructional competencies across the following five dimensions, with a focus on their ability to respond to industry requirements and engage effectively in school-enterprise cooperation.

1. Knowledge Dimension:

Assesses whether teachers possess essential subject knowledge and understanding of current industrial technologies, as well as curriculum design aligned with enterprise needs. This includes:

1.1 Teachers’ ability to apply project-based teaching models linked to real-world industry cases.

1.2 Teachers’ understanding of industrial technologies and their integration into course content.

1.3 Teachers’ ability to embed interdisciplinary and applied knowledge based on enterprise standards.

2. Skill Dimension:

Evaluates teachers' capabilities in planning and implementing practical teaching activities, managing enterprise-linked instructional content, and utilizing digital tools to enhance learning outcomes. This includes:

2.1 Teachers' ability to design practice-oriented teaching activities aligned with job tasks in cooperating enterprises.

2.2 Teachers' proficiency in using enterprise-related software, tools, or platforms in class.

2.3 Teachers' ability to formulate assessment tools that reflect both academic outcomes and employability competencies.

3. Cognitive & Decision-Making Dimension:

Assesses teachers' instructional flexibility, decision-making in dynamic classroom and workplace training environments, and responsiveness to industrial feedback. This includes:

3.1 Teachers' ability to adapt instructional content based on updated enterprise input.

3.2 Teachers' use of student and enterprise evaluation data to improve teaching design.

3.3 Teachers' problem-solving skills in managing school-enterprise joint projects or internships.

4. School-Enterprise Collaboration & Professional Practice Dimension:

Evaluates teachers' engagement in enterprise cooperation, internship guidance, and their ability to co-develop curricula with industry partners. This includes:

4.1 Teachers' active participation in joint curriculum development with enterprises.

4.2 Teachers' experience in guiding student internships or enterprise-based projects.

4.3 Teachers' collaboration with enterprise mentors or technical experts in the teaching process.

5. Attitudes and Values Dimension:

Measures teachers' commitment to industry-aligned teaching, lifelong learning, collaboration, and student employability development. This includes:

5.1 Teachers' recognition of enterprise needs as a key driver for teaching innovation.

5.2 Teachers' willingness to engage in ongoing industry-based training or upskilling.

5.3 Teachers' ability to guide students in career planning and real-world job expectations.

Through these measurement tools, this study aims to comprehensively assess the professional competencies of faculty members at the School of Engineering, Ezhou Vocational University, particularly their alignment with industry requirements and readiness for school-enterprise collaborative education. Based on the data, the study will analyze the developmental gaps and provide evidence-based guidance for institutional policy and teacher training programs that enhance vocational education outcomes.

Table 4 3.3 Research Variables and Their Measurement Constructs

Variable	Measurement Constructs	Number of Items per Dimension
Demographic Variables	Gender, Age, Academic Title, Years of Teaching, Education Level	5

Table 4 (Continued)

Variable	Measurement Constructs	Number of Items per Dimension
Knowledge Construct	- Project-Based Teaching Knowledge-Pedagogical Foundations - Subject Knowledge - Awareness of Industry Standards and Technological Trends - Teaching Design Ability	6
Skill Construct	- Digital Technology Integration - Development of Industry-Aligned Assessment Tools - Practical Implementation of Enterprise-Oriented Projects	10
Cognitive Potential Construct	- Problem-Solving Ability - Teaching Decision-Making Ability - Contextual Thinking in School-Enterprise Practice Scenarios	7

Table 4 (Continued)

Variable	Measurement Constructs	Number of Items per Dimension
Personal Traits and Motivation Construct	- Teaching Reflection Ability - Teamwork Ability - Adaptability to Enterprise-Oriented Teaching Challenges - Initiative in Professional Growth	4
Attitudes and Values Construct	- Teaching Goal Setting - Collaboration with Peers and Enterprise Stakeholders - Professional Ethics - Commitment to Student Career Orientation and Development	7

The content validity and linguistic accuracy of the questionnaire used in this study were evaluated by three experts, including the Program Director and the President of Ezhou Vocational University. The experts assessed the consistency between the research objectives and the questionnaire items. The Index of Item-Objective Congruence (IOC) was employed to determine the validity score for each item.

Rating is +1. There is an opinion that “Corresponds to definition.”

Rating is 0. There is an opinion that “Not sure it corresponds to definition.”

Rating is -1. There is an opinion that “Inconsistent with definition.”

The results obtained from experts were used to calculate the IOC Conformity Index according to the formula of (Rovinelli & Hambleton, 1976)as follows:

$$IOC = \frac{\sum R}{\mathrm{n}}$$

IOC = Index of Concordance between Questions and Objectives

∑R = The sum of the expert opinion scores.

n =Number of experts

Summarizing the results of the IOC, there are two standard requirements as follows:

1) If the calculated IOC value is more than or equal to 0.50, then the question is valid according to the content studied

2) If the calculated IOC value is less than 0.50, then the question does not valid according to the content studied

Part 2: A Semi-Structured Interview

This study employs a semi-structured interview approach to gain an in-depth understanding of the real-world experiences, challenges, and professional development needs of faculty members at higher vocational colleges in Hubei Province, particularly in the context of aligning their teaching competencies with enterprise talent demands. The use of semi-structured interviews allows participants the freedom to express their insights while complementing and deepening the quantitative data obtained from the questionnaire. This method enables the collection of richer, context-sensitive qualitative data and facilitates a more comprehensive analysis of institutional, instructional, and industry-aligned challenges.

A total of six teachers were selected from among the questionnaire respondents using purposive sampling. The interview questions focused on teachers’ professional development experiences, instructional reform practices, engagement with

school-enterprise collaboration, and reflections on teaching innovations. The open-ended questions posed to each participant included:

1. How do you manage the balance between delivering theoretical knowledge and developing students' practical skills in your teaching? Have you implemented any specific adjustments or innovations to enhance students' hands-on competencies?

2. Have you been involved in course design or teaching method reforms related to enterprise or industry cooperation? What were the main challenges you encountered? Could you share a successful case and explain how you addressed these challenges?

3. What innovative teaching methods have you tried in your instruction? What impacts have these methods had on student engagement and performance? How do you evaluate their effectiveness?

4. Regarding professional development, do you feel the training and support provided by your institution or enterprise partners are sufficient? How have these supports influenced your teaching practices? What further support do you consider necessary?

5. In light of the rapid changes in industry technologies and job market requirements, in which areas do you believe current teaching content and instructional approaches fall short?

6. What specific recommendations do you have for improving course content and instructional strategies to better prepare students for employment and industry integration?

To ensure the content validity of the qualitative instrument, three experts in vocational education were invited to review both the questionnaire and the interview protocol. The experts assessed the relevance of the content, clarity of language, and alignment with the study's research objectives. Their feedback ensured that the interview questions accurately captured the multifaceted aspects of professional

teaching competency development within the context of school-enterprise cooperation and contributed meaningful qualitative insights to the study.

Data Collection

The objective of this study is to examine the real-world experiences and challenges encountered by faculty members at Ezhou Vocational University in Hubei Province in the process of enhancing their professional teaching competencies, particularly in alignment with industry demands and national vocational education policies. To obtain both quantitative and qualitative data, the researcher employed a mixed-methods approach, utilizing a structured questionnaire and semi-structured interviews. Following the approval of the research proposal, the data collection process was carried out in the following stages:

1. The researcher first submitted a formal request to the relevant administrative departments of Ezhou Vocational University and obtained approval from institutional leaders and academic mentors to conduct the research activities.

2. Quantitative data collection was conducted via the Wenjuanxing platform. Electronic questionnaires were distributed to faculty members, who completed the survey online at their convenience. The researcher provided participants with an overview of the study and clarified any questions regarding the questionnaire or interview process to ensure clarity and data accuracy.

3. Upon completion of the survey, a purposive sample of twelve teachers was selected from the respondents for follow-up semi-structured interviews. These interviews explored participants' teaching practices, experiences with school-enterprise collaboration, and professional development needs, providing in-depth qualitative data for the study.

4. The collected data—both survey responses and interview transcripts—were analyzed using statistical analysis software and thematic coding techniques. The aim was to identify key factors influencing the development of professional teaching

competencies and to address the study's core research questions through integrated analysis.

5. Upon conclusion of the data collection phase, the researcher synthesized the findings and compiled a final report presenting the key results and evidence-based recommendations.

Data Analysis

This study adopts a mixed-methods approach. Data collection integrates both a questionnaire survey and semi-structured interviews, with the questionnaire data analyzed using statistical methods. The primary tool for data analysis was SPSS (Statistical Package for the Social Sciences), and the analysis includes frequencies (f), mean ($\bar{x}$), standard deviation (SD), percentage (%), analysis of variance (ANOVA), and t-tests.

1. Questionnaire Analysis: The questionnaire utilized in this study employs a five-point Likert scale (Likert, 1932), designed to measure teachers' performance in the process of enhancing their professional teaching competencies.

The questionnaire in this study utilized a five-point Likert scale, ranging from 1 to 5. Therefore, the evaluation criteria in this study are based on a scoring range of 0.80, as indicated by the following formula:

$$\text{Class interval} = \frac{\text{The highest width} - \text{The lowest width}}{\text{The width of class}}$$

$$= \frac{5-1}{5} = 0.8$$

The evaluation criteria of the ACR questionnaire for teachers were as follows:

1.00-1.80 means the level of English motivation is 'very low'.

1.81-2.60 means the level of English motivation is 'low'.

2.61-3.40 means the level of English motivation is 'moderate'.

3.41-4.20 means the level of English motivation is 'high'.

4.21-5.00 means the level of English motivation is 'very high'.

1) How do teachers use different teaching strategies to enhance students' professional competencies within the context of teaching? For this analysis, statistical methods, including frequency (f), percentage (%), mean ($\bar{x}$), and standard deviation (SD), were employed.

2) Are there significant differences in the enhancement of professional teaching competencies among teachers with different levels of teaching experience? This question was analyzed using Analysis of Variance (ANOVA), a statistical method used to compare the mean differences across three or more groups.

3) Are there significant differences in the enhancement of professional teaching competencies among teachers with different academic titles? This question was analyzed using a t-test, which compares the mean differences between two groups (e.g., assistant professors vs. lecturers).

2. Interview Analysis: The data from the semi-structured interviews were analyzed through Content Analysis, a qualitative method for identifying key themes and patterns. The researcher employed coding, categorization, and inductive reasoning to identify the key factors and challenges in the enhancement of teachers' professional teaching competencies.

By employing these statistical methods and qualitative techniques, this study aims to comprehensively analyze and evaluate the practical issues faced by teachers in the process of enhancing their professional teaching competencies, the strategies they employ, and the differences between teachers with varying levels of experience, academic titles, and other relevant characteristics.

CHAPTER 4
FINDINGS

This study was conducted to investigate the current status and areas for improvement in the professional teaching competencies of teachers at higher vocational colleges in Hubei Province, with particular attention to the alignment between instructional practices and the demands of industry. Specifically, it aimed to assess teachers' instructional effectiveness across five key dimensions: course design, practical teaching, instructional strategies and reflection, student support and communication, and industry-education integration. Additionally, the study examined whether teaching performance varied according to demographic factors such as gender, age, years of teaching experience, professional title, and educational background.

The analysis was based on responses from 45 teachers from the Faculty of Mechanical Engineering at Ezhou Vocational University, collected through a structured questionnaire utilizing a five-point Likert scale. To supplement the quantitative findings, in-depth semi-structured interviews were conducted to explore teachers' perceptions of instructional challenges, school-enterprise collaboration, and professional development needs.

This chapter presents the findings in accordance with the study's research questions. The first section outlines the demographic profile of the participating teachers. The second section summarizes the overall competency scores across the five dimensions of professional teaching. The third section compares teaching performance across demographic subgroups. The fourth section reports the results of the semi-structured interviews, providing qualitative insights into the contextual factors shaping instructional practices. The final section offers a summary of key findings.

4.1 Demographic Data

The first part of the questionnaire collected demographic information from the participants, including gender, age, academic title, teaching experience, and highest

educational qualification. The demographic data of the participants are presented in Table 1 using frequency and percentage values.

Table 5 4.1Demographic Profile of the Respondents

Category	Frequency	Percentage
Gender:		
Male	22	48.9%
Female	23	51.1%
Age:		
Under 30	9	20.0%
30–40	17	37.8%
40–50	10	22.2%
Over 50	9	20.0%
Academic Title:		

Table 5 (Continued)

Category	Frequency	Percentage
Assistant Lecturer	10	22.2%
Lecturer	15	33.3%
Associate Professor	9	20.0%
Professor	11	24.4%
Years of Teaching Experience:		
Less than 5 years	9	20.0%
6–10 years	11	24.4%
11–15 years	8	17.8%
16–20 years	10	22.2%

Table 5 (Continued)

Category	Frequency	Percentage
Over 21 years	7	15.6%
Highest Degree:		
Bachelor's	5	11.1%
Master's	23	51.1%
Doctorate	17	37.8%
Total	45	100.0%

Table 4.1 shows the demographic characteristics of the 45 teachers from the Faculty of Mechanical Engineering at Ezhou Vocational University who participated in this study. Among them, 22 (48.9%) were male and 23 (51.1%) were female, indicating a relatively balanced gender distribution. Regarding age, 20.0% of participants were under 30 years old, 37.8% were between 30 and 40, 22.2% were aged 40 to 50, and another 20.0% were over 50 years old, with a clear concentration in the 30–40 age group.

In terms of academic titles, 33.3% were lecturers, followed by professors (24.4%), assistant lecturers (22.2%), and associate professors (20.0%), showing a reasonable distribution across different professional ranks. Regarding teaching

experience, 24.4% of respondents had 6 to 10 years of experience, 22.2% had 16 to 20 years, 20.0% had less than 5 years, 17.8% had 11 to 15 years, and 15.6% had over 21 years of teaching experience, reflecting a faculty with varied stages of career development. As for academic qualifications, 51.1% of the teachers held a master's degree, 37.8% had a doctorate, and 11.1% had a bachelor's degree, indicating an overall high academic level.

Overall, the sample group displays a balanced gender ratio, a predominance of early- to mid-career teachers (particularly in the 30–40 age range), and a high level of academic qualifications, with most holding master's or doctoral degrees. The distribution of teaching experience suggests a mature and experienced teaching force. These demographic characteristics provide a comprehensive foundation for analyzing the professional teaching competencies of vocational education teachers in this study.

4.2 Professional Teaching Competency of Teachers in Five Dimensions

This section presents the results of the questionnaire regarding the professional teaching competencies of teachers in higher vocational colleges in Hubei Province. The questionnaire focused on five key competency dimensions: Knowledge, Skills, Cognitive Potential, Personal Traits and Motivation, and Attitudes and Values. Each item was rated on a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The findings are reported using the mean ($\bar{x}$) and standard deviation (SD).

Research Question 1: To analyze the challenges faced by vocational college teachers in Hubei Province in terms of their professional teaching abilities.

4.2.1 Knowledge Dimension

This section presents the results for the items under the Knowledge Dimension, which measured teachers' understanding and application of educational theories, subject-specific knowledge, interdisciplinary integration, and industry-relevant digital technologies. The items aimed to assess how well faculty members grasp foundational pedagogical concepts while aligning their instructional knowledge with enterprise practices and technological advancements. Table 2 summarizes the results in terms of mean scores ($\bar{x}$), standard deviation (SD), and interpretation level.

Table 6 4.2 Mean and Standard Deviation of Knowledge Dimension

Item	$\bar{x}$	SD	Interpretation
1. I understand and apply project-based teaching models that integrate enterprise case studies and real industry tasks.	3.49	1.31	Agree
2. I have mastered foundational knowledge in education, psychology, and pedagogy, and can link it to vocational learning contexts.	3.67	1.19	Agree
3. I can systematically apply subject-specific knowledge to support job-relevant teaching scenarios.	3.58	1.18	Agree
4. I am familiar with interdisciplinary knowledge structures and can incorporate cross-domain knowledge to enhance teaching effectiveness.	3.73	1.21	Agree
5. I can flexibly apply core disciplinary knowledge to address industry-oriented teaching challenges.	3.56	1.47	Agree
6. I understand how digital technologies (e.g., big data, AI, IoT) are applied in modern industry and can integrate these into my teaching.	3.67	1.23	Agree
Overall Knowledge Dimension	3.62	1.27	Agree

According to Table 4.2, teachers showed a generally high level of agreement in the Knowledge Dimension (M = 3.62, SD = 1.27), indicating that they possess a solid foundation of vocational teaching knowledge aligned with current educational and industry needs. The highest mean score was observed for Item 4, “I am familiar with interdisciplinary knowledge structures and can incorporate cross-domain knowledge to enhance teaching effectiveness” (M = 3.73), suggesting that teachers demonstrate strong interdisciplinary integration skills. This capacity is particularly valuable in vocational education, where cross-disciplinary knowledge supports integrated learning and curriculum innovation.

Items 2 and 6 followed closely, both with a mean score of 3.67. Item 2 focused on “foundational knowledge in education, psychology, and pedagogy, and its application to vocational learning contexts,” while Item 6 emphasized “understanding and integration of industry-relevant digital technologies (e.g., AI, big data, IoT)”. These results reflect a balanced development of theoretical understanding and digital literacy, enabling teachers to respond effectively to ongoing educational digitalization and the evolving needs of modern industry.

Item 3, “systematic application of subject-specific knowledge to job-relevant teaching scenarios” (M = 3.58), and Item 5, “flexible application of core disciplinary knowledge to address industry-oriented teaching challenges” (M = 3.56), further confirm that teachers possess robust domain expertise that can be adapted to real-world instructional demands.

However, Item 1, “understanding and application of project-based teaching models that integrate enterprise case studies and real industry tasks,” recorded the lowest mean score (M = 3.49). Although still within the “Agree” interpretation, this lower score may indicate that teachers feel less confident in designing and delivering authentic, enterprise-linked project-based learning experiences—one of the central goals of school-enterprise cooperation. Given the relatively high standard deviation (SD = 1.27), the data also suggest noticeable individual differences in knowledge proficiency among teachers.

These findings point to the need for differentiated professional development, particularly targeting the design and implementation of industry-integrated project-based instruction and the effective use of digital technologies to enhance practice-oriented teaching.

4.2.2 Skill Dimension

This section reports the results for the Skill Dimension, which assessed teachers' abilities to design, organize, implement, and evaluate project-based instruction in alignment with real-world vocational and industrial contexts. The items also measured teachers' capacity to integrate digital technologies, collaborate across disciplines, and apply teaching strategies that reflect enterprise tasks and standards. Table 3 presents the mean scores ($\bar{x}$), standard deviation (SD), and interpretation for each item.

Table 7 4.3 Mean and Standard Deviation of Skill Dimension

Item	$\bar{x}$	SD	Interpretation
7. I can design project-based teaching activities that reflect real enterprise processes and professional tasks.	3.53	1.24	Agree
8. I can co-develop teaching materials and tools in collaboration with enterprise partners to support authentic learning.	3.40	1.32	Neutral
9. I can effectively integrate digital technologies into industry-relevant teaching practices.	3.60	1.21	Agree

Table 7 (Continued)

Item	$\bar{x}$	SD	Interpretation
10. I can structure subject knowledge to support interdisciplinary and application-driven learning.	3.69	1.38	Agree
11. I can adapt and reorganize knowledge content to develop modular, competency-based teaching units.	3.69	1.35	Agree
12. I conduct teaching research that addresses real student needs and complex problems arising from workplace scenarios.	3.53	1.27	Agree
13. I can innovate teaching content based on enterprise expectations and the technical features of my subject.	3.53	1.29	Agree
14. I can design practical, competency-based assessment tools that reflect industry standards.	3.67	1.30	Agree
15. I create opportunities for students to apply knowledge in real or simulated work settings, enhancing practical skills.	3.56	1.34	Agree
16. I analyze learning data to inform ongoing teaching improvement and optimize alignment with industrial expectations.	3.71	1.37	Agree
Overall Skill Dimension	3.59	1.31	Agree

According to Table 4.3, teachers reported a generally positive perception of their instructional skills within the Skill Dimension (M = 3.59, SD = 1.31), reflecting a moderate to high level of competence in designing and implementing industry-relevant teaching. The highest score was recorded for Item 16, “I analyze learning data to inform ongoing teaching improvement and optimize alignment with industrial expectations” (M = 3.71), indicating teachers' growing emphasis on evidence-based instructional improvement and responsiveness to vocational demands.

Strong performance was also observed for Item 10, “I can structure subject knowledge to support interdisciplinary and application-driven learning” (M = 3.69), and Item 11, “I can adapt and reorganize knowledge content to develop modular, competency-based teaching units” (M = 3.69). These results suggest that teachers are confident in curriculum integration and the transformation of knowledge for practical teaching applications.

Other areas of strength included designing competency-based assessments aligned with industry standards (Item 14: M = 3.67), integrating digital technologies into industry-relevant practices (Item 9: M = 3.60), and creating opportunities for students to engage in real or simulated work tasks (Item 15: M = 3.56). These findings highlight the teachers’ capacity to connect instructional design with both digital innovation and workplace-oriented learning outcomes.

However, Item 8, “I can co-develop teaching materials and tools in collaboration with enterprise partners to support authentic learning” (M = 3.40), received the lowest score, falling into the “Neutral” range. This indicates a relative lack of confidence or experience in cross-sector resource development, suggesting that closer collaboration with enterprises in course material co-design remains an area in need of support.

Overall, while most items fall within the “Agree” range, the relatively wide spread in standard deviations (SD = 1.21–1.38) indicates variability in teachers' skill development. These findings underscore the need for differentiated professional development strategies, particularly focused on deepening partnerships with industry

and enhancing the capacity for collaborative, digital, and competency-based instructional design.

4.2.3 Cognitive Potential Dimension

This section presents the analysis of the Cognitive Potential Dimension, which assessed teachers' abilities to design exploratory teaching strategies, solve complex instructional problems, utilize data to inform pedagogical decisions, and apply logical and critical thinking in vocational contexts. The items in this dimension also examined how well teachers can adapt to uncertain situations and develop innovative solutions aligned with real-world workplace scenarios. Table 4 summarizes the mean scores ($\bar{x}$), standard deviations (SD), and interpretation levels for each item within this dimension.

Table 8 4.4 Mean and Standard Deviation of Cognitive Potential Dimension

Item	$\bar{x}$	SD	Interpretation
17. I design exploratory teaching strategies that reflect authentic, complex enterprise problems.	3.51	1.04	Agree
18. I adapt instructional methods based on iterative reflection cycles and feedback from real teaching and industry scenarios.	3.53	1.44	Agree
19. I recognize the value of data generated in practice and use it to guide evidence-based teaching decisions.	3.80	1.12	Agree
20. I can identify optimal teaching solutions under uncertain or complex instructional conditions.	3.73	1.05	Agree

Table 8 (Continued)

Item	$\bar{x}$	SD	Interpretation
21. I can analyze and reconstruct knowledge frameworks to build effective, task-based instructional plans.	3.76	1.07	Agree
22. I guide students to identify core problems in complex contexts and apply logical thinking to resolve them.	3.64	1.26	Agree
23. I critically evaluate information and generate creative instructional strategies responsive to vocational challenges.	3.56	1.42	Agree
Overall Cognitive Potential Dimension	3.65	1.20	Agree

According to Table 4.4, teachers demonstrated a generally positive perception of their cognitive potential in addressing complex instructional challenges, with an overall mean score of 3.65. The highest scoring item was Item 19, “I recognize the value of data generated in practice and use it to guide evidence-based teaching decisions” ($\bar{x}$ = 3.80), reflecting a strong awareness among teachers regarding the use of data to support instructional refinement and decision-making.

Other high-performing items included Item 21, “I can analyze and reconstruct knowledge frameworks to build effective, task-based instructional plans” ($\bar{x}$ = 3.76), and Item 20, “I can identify optimal teaching solutions under uncertain or complex instructional conditions” ($\bar{x}$ = 3.73). These results suggest that many teachers possess structured thinking, adaptability, and the ability to navigate ambiguous

instructional environments—competencies that are essential in dynamic, industry-linked teaching scenarios.

Moderate agreement levels were observed in Item 22, “I guide students to identify core problems in complex contexts and apply logical thinking to resolve them” ($\bar{x}$ = 3.64), and Item 23, “I critically evaluate information and generate creative instructional strategies responsive to vocational challenges” ($\bar{x}$ = 3.56), indicating that while teachers are confident in their logical and critical thinking, there is still room to further strengthen their innovative responses to real-world teaching demands.

The lowest mean scores were seen in Item 17, “I design exploratory teaching strategies that reflect authentic, complex enterprise problems” ($\bar{x}$ = 3.51), and Item 18, “I adapt instructional methods based on iterative reflection cycles and feedback from real teaching and industry scenarios” ($\bar{x}$ = 3.53). Although these items remain within the “Agree” range, they highlight relatively weaker areas in creative exploration and reflective adaptation, which may require further support through targeted professional development.

Standard deviations across this dimension ranged from 1.04 to 1.44, indicating a moderate to high degree of variability in teacher responses. This variation suggests that while some educators feel confident in managing cognitively demanding tasks, others may lack experience or specific training—particularly in innovating and responding to complex, enterprise-driven instructional challenges.

In summary, the findings indicate that participants possess a solid cognitive foundation for instructional decision-making and problem-solving, with particular strengths in data use and structured planning. However, more differentiated training is recommended to support the development of exploratory thinking and innovation in real-world, project-based teaching contexts.

4.2.4 Personal Traits and Motivation Dimension

This section presents the results of the Personal Traits and Motivation Dimension, which assessed teachers’ capacity for continuous self-reflection, effective collaboration in team-based instructional development, adaptability under pressure, and

proactive engagement with data to improve teaching practices. The items within this dimension emphasized the individual and interpersonal attributes that support sustained professional growth and responsiveness to evolving vocational education demands.

Table 9 4.5: Mean and Standard Deviation of Personal Traits and Motivation Dimension

Item	$\bar{x}$	SD	Interpretation
24. I consistently reflect on my teaching practices and adjust strategies to better align with student and enterprise feedback.	3.42	1.29	Agree
25. I collaborate actively with colleagues and industry mentors to co-develop innovative, project-based teaching solutions.	3.64	1.53	Agree
26. I am able to remain composed and adaptable under teaching pressures or unexpected real-world disruptions.	3.69	1.31	Agree
27. I independently identify areas for improvement and engage in continuous professional learning linked to industry trends.	3.69	1.36	Agree
Overall Personal Traits and Motivation Dimension	3.61	1.37	Agree

As shown in Table 4.5, all four items under the Personal Traits and Motivation Dimension were rated within the “Agree” range, with an overall mean score of 3.61. The highest scores were recorded for Item 26, “I am able to remain composed and adaptable under teaching pressures or unexpected real-world disruptions” ($\bar{x}$ = 3.69), and Item 27, “I independently identify areas for improvement and engage in continuous

professional learning linked to industry trends" ($\bar{x}$ = 3.69). These results suggest that many teachers possess strong resilience and initiative in responding to changing instructional demands, particularly in vocational and enterprise-integrated environments.

Item 25, "I collaborate actively with colleagues and industry mentors to co-develop innovative, project-based teaching solutions" ($\bar{x}$ = 3.64), also received a relatively high score, indicating a generally positive attitude toward teamwork and cross-sector instructional collaboration. In contrast, the lowest mean was observed for Item 24, "I consistently reflect on my teaching practices and adjust strategies to better align with student and enterprise feedback" ($\bar{x}$ = 3.42). While still falling within the "Agree" interpretation, this result may suggest a need for more structured guidance or institutional mechanisms to support systematic reflection and responsive adjustment during teaching.

Notably, the standard deviations for this dimension ranged from 1.29 to 1.53, revealing considerable variability in teacher responses. This variation implies that although many faculty members exhibit strong personal traits and motivational dispositions, others may still be developing their reflective capacity, adaptive skills, or self-driven professional growth—particularly in relation to industry-aligned teaching contexts.

In summary, the findings point to a generally positive outlook regarding personal and motivational competencies, while also highlighting the importance of differentiated support strategies to cultivate reflective, collaborative, and forward-looking teaching mindsets across the faculty.

4.2.5 Attitudes and Values Dimension

This section presents the findings related to the Attitudes and Values Dimension, which assessed teachers' professional commitment to goal-oriented instruction, cross-sector collaboration, ethical conduct, critical thinking facilitation, empathy toward students, and continuous learning—particularly in relation to integrating digital technologies and enhancing students' workplace readiness. The items under this

dimension reflect core values essential for effective teaching in industry-oriented vocational education contexts.

Table 10 4.6: Mean and Standard Deviation of Attitudes and Values Dimension

Item	$\bar{x}$	SD	Interpretation
28. I set ambitious teaching goals that aim to develop both technical and employability skills in my students.	3.62	1.27	Agree
29. I proactively engage in collaboration with both educational peers and enterprise stakeholders.	3.73	1.34	Agree
30. I regularly reflect on teaching outcomes and actively implement strategies for targeted instructional improvement.	3.58	1.31	Agree
31. I have a strong commitment to continuous learning and integrating relevant digital technologies in my pedagogy.	3.47	1.34	Agree
32. I foster students' ability to analyze complex problems, promoting critical thinking and self-directed learning.	3.42	1.31	Agree
33. I guide students to challenge assumptions and build independent, critical attitudes essential for workplace success.	3.51	1.34	Agree

Table 10 (Continued)

Item	$\bar{x}$	SD	Interpretation
34. I uphold professional ethics, demonstrate empathy, and support students' emotional and developmental needs.	3.64	1.35	Agree
Overall Attitudes and Values Dimension	3.57	1.32	Agree

According to Table 4.6, all items under the Attitudes and Values Dimension received "Agree" ratings, with an overall mean score of 3.57 and a standard deviation of 1.32. This indicates that vocational college teachers generally demonstrate positive professional values, including ethical commitment, collaborative spirit, and concern for student development and learning outcomes.

The highest score was recorded for Item 29, "I proactively engage in collaboration with both educational peers and enterprise stakeholders" ($\bar{x}$ = 3.73), reflecting a strong inclination among teachers to foster cross-sector cooperation—an essential component of school-enterprise integration. Similarly, Item 34, "I uphold professional ethics, demonstrate empathy, and support students' emotional and developmental needs" ($\bar{x}$ = 3.64), received a high rating, suggesting that teachers consistently uphold interpersonal responsibility and ethical standards in their teaching roles.

Moderate agreement was observed in Item 28, "I set ambitious teaching goals that aim to develop both technical and employability skills in my students" ($\bar{x}$ = 3.62), and Item 30, "I regularly reflect on teaching outcomes and actively implement strategies for targeted instructional improvement" ($\bar{x}$ = 3.58), indicating that teachers are goal-oriented and engaged in reflective improvement, though there may still be room for more systematic application.

The relatively lower scores were seen in Item 31, “I have a strong commitment to continuous learning and integrating relevant digital technologies in my pedagogy” ($\bar{x}$ = 3.47), and Item 32, “I foster students’ ability to analyze complex problems, promoting critical thinking and self-directed learning” ($\bar{x}$ = 3.42). While both items still fall within the “Agree” range, they highlight areas where teachers may benefit from additional professional development—especially in digital pedagogy and student-centered, autonomy-enhancing instructional strategies.

The standard deviations across all items (ranging from 1.27 to 1.35) suggest notable variability in teachers' attitudes and values. This reflects differing levels of experience, personal teaching philosophies, and readiness to adapt to evolving educational trends. Overall, the findings confirm that teachers exhibit strong foundational professional values, with further development needed in areas such as innovation, digital integration, and critical-thinking facilitation.

4.3 Semi-Structured Interviews

This section presents the results of the semi-structured interviews, analyzed using content analysis. The interviews were conducted with selected teachers from the Faculty of Mechanical Engineering at Ezhou Vocational University to gain deeper insights into their professional experiences, teaching challenges, and developmental needs. The qualitative findings provided rich contextual support for the quantitative results obtained through the questionnaire, offering a more comprehensive understanding of teachers’ professional competencies and their alignment with vocational education policies and school-enterprise cooperation practices.

4.3.1 Basic Information of Interviewees

Table 11 4.7 Basic Information of Interviewed Teachers

Name	Career Role	Teaching Experience	Position	Level of Teaching Competence Awareness	Notes
Zhang Wei	Mechanical Engineering Teacher	12 years	Senior Lecturer	High	Specialized in project-based learning
Li Fang	Mechanical Engineering Teacher	8 years	Lecturer	Moderate	Focus on interdisciplinary integration
Chen Yong	Vocational Education Researcher	18 years	Professor	High	Researches teacher development in Hubei
Wang Lan	Educational Technology Expert	10 years	Curriculum Designer	Quite high	Specializes in digital tools for teaching
Liu Qiang	Young Faculty Member	3 years	Assistant Lecturer	Developing	Interested in professional skills training

From Table 4.7, it was found that the table presents the basic information of the personnel interviewed in this research. The first interviewee is Zhang Wei, a senior lecturer in mechanical engineering with 12 years of teaching experience. He works at a

higher vocational college in Hubei Province. Zhang specializes in project-based learning and has designed several teaching units that integrate practical engineering tasks with core curriculum standards. His teaching emphasizes real-world problem-solving and collaborative student learning.

Li Fang, also a mechanical engineering teacher, has been teaching for 8 years and holds the position of lecturer. She is particularly interested in interdisciplinary integration and often collaborates with colleagues from electronics and computer departments to develop cross-disciplinary projects. She believes that interdisciplinary learning better prepares students for complex industry needs.

Chen Yong is a professor and a long-time researcher in vocational education, with 18 years of academic experience. His research focuses on the development and assessment of teaching competence among vocational teachers in Hubei. He has led several province-level projects related to teacher professional development, and his perspectives reflect both theoretical depth and practical insight.

Wang Lan is an expert in educational technology, currently serving as a curriculum designer in a vocational institution. With 10 years of experience, she has focused on the integration of digital tools into teaching, particularly in developing digital resources and platforms for project-based instruction. Her work supports teachers in enhancing their classroom innovation and engagement.

Liu Qiang is a young faculty member and assistant lecturer who has been teaching for 3 years. He is currently exploring professional skills training approaches for vocational students and is keen to improve his teaching competence, especially in areas related to project organization and classroom evaluation. Although relatively new to the profession, he demonstrates strong motivation for growth and innovation in teaching.

The first interview question was: “How do you manage the balance between delivering theoretical knowledge and developing students' practical skills in your teaching? Have you implemented any specific adjustments or innovations to enhance students' hands-on competencies?”

1) Interview Review

Zhang Wei, a senior lecturer in mechanical engineering, described his strategy for balancing theory and practice by starting each session with concise theoretical input, immediately contextualized using real-world industrial cases. He emphasized that project-based learning serves as his primary instructional method, allowing students to connect theoretical principles with authentic mechanical tasks. For example, students first learn the fundamentals of mechanical design in class, and then apply them through structured hands-on workshops. He stressed that cultivating practical competence is not separate from theory, but rather an outcome of its meaningful application.

Li Fang echoed this integrated approach, highlighting interdisciplinary teaching modules that combine mechanical and electrical knowledge. She stated that when students are asked to complete team-based tasks that require knowledge from multiple domains, abstract theories become clearer. “Students often struggle with formulas in isolation, but when applied to a working prototype, they begin to understand,” she explained. Her approach is to alternate between explanation and application in a spiral progression that reinforces understanding.

Chen Yong, a researcher in vocational pedagogy, provided a more systemic view. He noted that the disconnection between theory and practice remains a challenge in vocational colleges. He advocated for task-centered curriculum design where students “think while doing,” supported by reflective practice. According to his fieldwork, early integration of practical tasks enhances students’ comprehension and long-term retention of theoretical concepts.

Wang Lan, a curriculum designer specializing in digital instruction, emphasized the importance of technology-enabled learning environments. She shared how simulation software helps students test engineering principles virtually before conducting physical operations. “It reduces risk and builds confidence,” she noted. She recommended blended learning models that sequence conceptual instruction, digital

simulation, and hands-on execution to facilitate a gradual transition from theory to practice.

Liu Qiang, a junior faculty member, acknowledged the challenges of balancing theory and practice, especially for novice instructors. He is experimenting with team teaching and peer observation to refine his approach. “Sometimes a senior colleague introduces the concept, while I guide the lab session,” he explained. He believes such collaborative practices are vital for helping younger educators build confidence and competence in integrating theory with hands-on learning.

2) Interview Content Analysis

1. Theoretical instruction is most effective when embedded in practical tasks

All interviewees stressed the importance of linking theoretical concepts with practical application. Typically, this involves starting with a brief explanation, followed by an immediate shift to hands-on tasks. This sequencing enhances students’ understanding of theoretical content, reinforces relevance, and improves engagement and retention.

2. Interdisciplinary integration supports more meaningful learning

Some participants noted that combining knowledge across disciplines—such as mechanical and electrical engineering—helps students better grasp how abstract theory informs real-world functions. Interdisciplinary projects not only reinforce conceptual connections but also cultivate collaboration and problem-solving skills aligned with industry needs.

3. Novice teachers struggle to balance theory and practice

Several respondents pointed out that newer teachers often lack the instructional experience to effectively integrate theory with practice. Their lessons may be overly theoretical or disconnected from application. Structured mentorship, co-teaching models, and peer observation were suggested as practical strategies to support their professional development.

4. Digital tools facilitate the theory-to-practice transition

Simulation software and virtual labs were frequently cited as tools that allow students to safely test and refine their understanding of abstract principles before engaging in physical practice. These technologies reduce the barrier between conceptual learning and real-world application, especially in technical fields requiring precision.

5. Integrated task design enhances vocational competence

Participants emphasized the value of designing instructional tasks that require simultaneous cognitive engagement and practical execution. Rather than separating theoretical lectures from lab sessions, integrated tasks encourage students to “think while doing,” which aligns more closely with workplace expectations and fosters the development of holistic vocational competence.

The analysis reveals a shared emphasis on seamlessly connecting theoretical knowledge with practical skills in vocational education. Effective strategies identified by participants include project-based learning, interdisciplinary module design, technology integration, and collaborative teaching models. However, the challenges faced by less experienced instructors point to the need for sustained, differentiated professional development to strengthen instructional design capacity and ensure a balanced delivery of both theory and practice.

The second interview question was: “Have you been involved in course design or teaching method reforms related to enterprise or industry cooperation? What were the main challenges you encountered? Could you share a successful case and explain how you addressed these challenges?”

1) Interview Review

Zhang Wei, a senior lecturer in mechanical engineering, reported active involvement in industry-linked curriculum reform. He co-led a project to redesign the “Mechanical Fundamentals” course by embedding modular, project-based tasks that simulate enterprise workflows. Through direct consultation with corporate partners, he adjusted both the content and assessment indicators to reflect real job requirements.

One major challenge, he noted, was reconciling academic objectives with enterprise expectations. “Industry wants results fast, but students need scaffolding,” he said. His solution was to stage tasks progressively, allowing for concept buildup while maintaining real-world relevance.

Li Fang described her participation in a cross-departmental reform initiative, aimed at fostering interdisciplinary integration in line with industry cooperation. She helped redesign several courses to include learning scenarios that combine mechanical and automation knowledge. A key difficulty she encountered was the lack of coordinated teaching resources and expertise across departments. To address this, she initiated regular planning meetings among instructors from different specialties and co-developed shared task libraries. She noted that these collaborative frameworks increased teaching consistency and improved students’ interdisciplinary thinking.

Chen Yong, a vocational education researcher, has led and observed numerous curriculum reforms across institutions. He emphasized that many top-down reforms struggle due to insufficient teacher involvement and contextual adaptation. In one successful case, he facilitated a teacher-led reform at a vocational institute, where instructors co-created enterprise-aligned teaching tasks based on interviews with employers. He concluded that teacher ownership and field-informed design are key to sustainability in industry-oriented curriculum development.

Wang Lan focused on digital teaching reforms tied to enterprise practices. She developed blended modules that combined virtual simulations, multimedia content, and lab-based tasks. She explained that her major challenge was faculty resistance to new tools and a lack of technical infrastructure. To overcome this, she ran internal workshops and gradually integrated digital elements into existing courses. She found that student motivation and engagement significantly improved when digital tools were used to simulate job environments.

Liu Qiang, a junior faculty member, shared that while he has not independently led reform initiatives, he has been actively involved in co-designing practice-oriented lab modules with mentorship from senior colleagues. He cited a case

where they redesigned a mechanical testing unit to better reflect enterprise procedures. Although initially unfamiliar with project planning, he learned to align teaching goals with operational tasks. He stated that such exposure has helped him better understand the complex demands of vocational curriculum reform.

2) Interview Content Analysis

1. Enterprise-aligned course design is driven by experienced faculty

Several participants reported direct involvement in course redesign efforts connected to industry needs. Senior teachers typically led these reforms, integrating real enterprise tasks and assessment models into instructional design. Despite challenges in aligning academic and corporate expectations, adaptive strategies—such as phased task development—were used to bridge the gap.

2. Interdisciplinary and cross-unit collaboration is essential but difficult

Effective reforms often required collaboration across subject areas and administrative units. However, inconsistent planning and fragmented expertise posed challenges. Interviewees addressed these through structured coordination mechanisms, shared resources, and task co-development, which enhanced interdisciplinary coherence and improved alignment with industry practices.

3. Teacher-led reform ensures contextual relevance and sustainability

Respondents emphasized that successful reforms must involve teachers as co-designers rather than passive implementers. Top-down mandates often faltered when detached from frontline realities. Reform outcomes were more sustainable when teachers had ownership over course objectives and maintained direct communication with industry stakeholders.

4. Digital innovation supports reform but requires cultural change

Digital integration emerged as a significant reform theme. Teachers who implemented blended learning and simulation tools found them effective in preparing students for complex industry tasks. However, barriers such as resistance to change and inadequate training were noted. Gradual implementation and peer-led capacity building helped mitigate these issues.

5. Junior faculty gain competence through co-design and mentorship

Less experienced instructors were typically not leading reforms but played supporting roles in co-designing and piloting new modules. Through collaboration with senior staff, they developed curriculum planning skills and gained insight into how to translate industry input into classroom practice. Mentorship and shared planning were seen as essential for nurturing future reform leaders.

The interviews highlight that enterprise-related course and instructional reforms are gaining momentum in vocational colleges, particularly through collaborative, interdisciplinary, and digital approaches. Participants emphasized the need for reforms to reflect real workplace contexts, ensure teacher engagement, and provide professional support—especially for early-career educators. Despite practical challenges, successful cases point toward growing institutional responsiveness to industry expectations through bottom-up, teacher-driven innovation.

The third question asked: “3. What innovative teaching methods have you tried in your instruction? What impacts have these methods had on student engagement and performance? How do you evaluate their effectiveness?”

1) Interview Review

Zhang Wei, a senior lecturer in mechanical engineering, described his long-term use of project-based learning (PBL) in his instruction. His students complete group projects that simulate real industrial processes, such as moving from conceptual design to prototype development. He observed that this approach significantly improves student engagement, collaboration, and problem-solving skills, aligning closely with the core competencies required in vocational settings. He evaluates effectiveness based on students’ ability to independently complete tasks and their performance in final project presentations.

Li Fang shared her experience implementing the flipped classroom model. She assigns theoretical learning materials online before class and uses class time for case discussions, peer instruction, and hands-on practice. She reported that

this structure enhances student preparedness and participation. “Students come to class ready to solve problems,” she noted, adding that classroom activities have become more dynamic and focused. She measures effectiveness by comparing student performance on applied tasks before and after implementation, as well as through observation of classroom interactions.

Chen Yong, a researcher in vocational education, emphasized the integration of reflective learning and problem-based tasks. He explained that innovation in teaching is not limited to new technologies, but also involves shifting the pedagogical focus toward inquiry and construction. He encourages teachers to design learning experiences that require students to explore, ask questions, and make meaning actively. His evaluation strategy includes student reflections, formative feedback, and changes in learner autonomy.

Wang Lan, an educational technologist, highlighted her development of blended learning environments for vocational training. She created digital simulation modules that allow students to practice technical skills in a low-risk, interactive format before entering physical workshops. According to her, these simulations increase confidence, improve conceptual understanding, and reduce errors in hands-on environments. She uses platform analytics, student feedback, and pre/post-simulation assessments to evaluate their impact.

Liu Qiang, a new instructor, discussed his use of scenario-based teaching to simulate workplace problems. He creates learning situations where students work through semi-independent tasks that mimic real job responsibilities. He observed increased student motivation and contextual understanding. As part of his development, he receives guidance from senior colleagues and is gradually incorporating inquiry-based and learner-centered elements into his teaching. His evaluation is based on peer feedback, student engagement during task execution, and improvements in student project performance.

2) Interview Content Analysis

1. Practice-integrated methods form the basis of innovation

All participants emphasized that effective innovation in vocational education begins with enhancing the authenticity of the learning experience. Project-based learning, scenario tasks, and industry simulations were highlighted as effective strategies to embed practical skill development into the learning process, thus ensuring relevance and engagement.

2. Flexible instructional models increase student autonomy

Several teachers adopted flipped classroom approaches and restructured their teaching to give students more control over learning pace and time. By delivering theoretical content outside of class, they used class time for deeper interaction, application, and feedback. These models promote self-directed learning and personalized engagement, which are increasingly important in dynamic vocational contexts.

3. Technology supports preparation and application

Digital simulations, interactive learning tools, and hybrid instructional formats were widely adopted as bridging mechanisms between theoretical instruction and physical practice. These tools enable students to rehearse skills, reduce performance anxiety, and gain procedural familiarity. Teachers viewed these innovations as enhancers—not replacements—for hands-on learning.

4. Early-career instructors actively engage in pedagogical experimentation

Younger teachers, while less experienced, showed a strong willingness to experiment with scenario-based, inquiry-driven, and collaborative learning techniques. With mentorship support, they are building reflective practices and gradually adopting student-centered pedagogies that mirror real-world environments.

The interviews show that teaching innovation in vocational education is taking place through meaningful adaptation, rather than radical transformation. Across the board, teachers are implementing practice-oriented, flexible, and digitally enhanced methods to better serve student learning and industry readiness. Their reflections

suggest a maturing professional culture where teaching is continuously improved through reflection, collaboration, and alignment with evolving demands.

The fourth question was: “4. Regarding professional development, do you feel the training and support provided by your institution or enterprise partners are sufficient? How have these supports influenced your teaching practices? What further support do you consider necessary?”

1) Interview Review

Zhang Wei, a senior lecturer, shared that his institution regularly offers professional development activities such as workshops and pedagogical seminars. However, he found that these sessions often focus on policy dissemination or general teaching theories, with limited relevance to the specific challenges of vocational education. He emphasized the lack of practical follow-up and application support, especially for issues like task-based curriculum design or workshop assessment strategies. In his view, context-specific and continuous professional guidance is urgently needed to bridge the gap between training and practice.

Li Fang echoed this concern, stating that although training is scheduled periodically, it rarely addresses the interdisciplinary and hands-on demands of vocational instruction. She pointed out that the most valuable insights often come from informal exchanges with peers during co-planning sessions or collaborative teaching projects. Compared to structured training, peer-led interactions are more closely aligned with day-to-day teaching demands and often provide ready-to-use solutions.

Chen Yong, as a vocational education researcher, critiqued the current training model as being too administratively driven, often intended to meet compliance requirements rather than teacher needs. He advocated for embedded professional development, where teachers can apply new ideas within real classrooms, experiment with methods, and refine them through reflection. He stressed that without such integration, many reforms remain superficial or short-lived.

Wang Lan discussed the support for digital transformation in her institution. While the school invested in platforms and tools, support for teachers was inconsistent. Some received structured guidance, while others lacked the necessary technical training. She called for differentiated training models tailored to teachers' digital readiness levels and actual teaching scenarios. She also emphasized the importance of integrating technology training into authentic teaching tasks rather than treating it as a separate activity.

Liu Qiang, a new teacher, appreciated the induction training he received when he joined the faculty, which helped him understand institutional norms and basic teaching practices. However, he noted a sharp drop-off in structured support after his first year. He highlighted the value of long-term mentoring, especially in areas such as student-centered design, project planning, and interdisciplinary teaching. Informal mentorship from senior colleagues, he said, had been instrumental in helping him develop his teaching skills.

2) Interview Content Analysis

1. Training opportunities exist but lack contextual depth

Most interviewees acknowledged that their institutions offer professional development programs. However, the generalized and theory-heavy nature of these sessions limits their effectiveness in vocational education. Teachers reported that topics like classroom management or education policy were frequently emphasized, but practical areas such as designing project-based modules, integrating interdisciplinary skills, or managing real workshop scenarios were underrepresented. As a result, many teachers felt a disconnect between training content and actual teaching needs.

2. Peer mentoring and informal learning as crucial complements

A consistent theme across interviews was the importance of informal professional development, especially for younger faculty. Peer collaboration, co-teaching, and reflective conversations with senior instructors were seen as more practical, relevant, and emotionally supportive. Early-career teachers especially relied

on informal mentoring to build their confidence, develop course content, and navigate complex teaching environments. This suggests that sustainable professional development must go beyond isolated training sessions to include embedded peer networks.

3. Uneven support for digital teaching and innovation

While many institutions are pushing for digital innovation, teachers' access to support varies widely. Some interviewees had received comprehensive training and technical assistance, while others struggled alone. One-size-fits-all approaches proved ineffective, and participants emphasized the need for tiered support—starting with teachers' digital competence and evolving through practical integration into vocational instruction. Digital training must also be linked to discipline-specific applications, not treated as generic tools.

Overall, the interview findings reveal that although professional development structures are in place, they often fall short of vocational education's applied and evolving needs. Teachers are calling for more contextualized, iterative, and practically grounded training opportunities, along with greater institutional investment in peer support and differentiated digital capacity building. These findings underscore the importance of shifting professional development from a compliance model to a teacher-centered, practice-oriented framework that truly supports instructional transformation.

The fifth question was: "5. In light of the rapid changes in industry technologies and job market requirements, in which areas do you believe current teaching content and instructional approaches fall short?"

1) Interview Review

Zhang Wei pointed out that current curriculum content often lags behind advancements in industry practices, especially in fields such as mechanical design and digital manufacturing. He emphasized that some teaching equipment is outdated, which limits students' ability to engage with modern tools, processes, and workflows commonly used in enterprises.

Li Fang echoed this concern, observing that although smart automation and intelligent systems are increasingly prevalent in industry, instructional methods and course content have not kept pace. She noted that the emphasis in classrooms remains on theoretical delivery, with insufficient alignment to hands-on application in real-world contexts.

Chen Yong, reflecting from a policy and institutional standpoint, described a key structural challenge: curriculum reform is constrained by bureaucratic approval procedures, which makes timely updates difficult. Even when teachers are aware of emerging industry trends, institutional inertia often prevents them from integrating relevant updates into teaching content or pedagogical approaches in a responsive way.

Wang Lan highlighted insufficient faculty training in new technologies as a root cause. She explained that while digital platforms and industrial tools are becoming integral to the workplace, many teachers lack the preparation or support needed to integrate them effectively into instruction. Without targeted training, she argued, instructors risk delivering content that is disconnected from technological realities.

Liu Qiang, representing the perspective of a younger faculty member, expressed concern about the continued compartmentalization of subject areas. He pointed out that real-world jobs increasingly require interdisciplinary competencies, but teaching methods remain largely subject-specific. This hinders students' ability to apply integrated knowledge in cross-functional work settings, which are common in modern industries.

2) Interview Content Analysis

1. Teaching content fails to reflect technological evolution in industry

A prominent concern among participants was the growing mismatch between what is taught in classrooms and what is practiced in contemporary industries. Courses in areas like automation, smart manufacturing, and digital design were described as relying on outdated examples or equipment, reducing their relevance and

authenticity. This not only limits students' employability, but also diminishes engagement as students fail to see clear links between coursework and workplace realities.

2. Institutional rigidity hinders timely curricular adaptation

Participants reported that even when teachers identify the need to revise instructional content or methods, institutional mechanisms often prevent timely implementation. Long approval processes, standardized syllabi, and top-down policy constraints make it difficult for teachers to innovate or tailor lessons to current industry trends. This leads to a reactive rather than proactive approach in course reform, where schools adapt only after significant industry shifts have already occurred.

3. Teacher readiness in emerging technologies is uneven and under-supported

Another critical gap lies in teacher development. While new technologies are transforming vocational fields, teacher training programs have not evolved at the same pace. Many instructors lack access to structured upskilling in areas like digital simulation, AI applications, or interdisciplinary pedagogy. Without this support, even well-intentioned educators are unable to incorporate emerging tools or industry-relevant content into their teaching. The problem is compounded by a lack of differentiated training based on instructors' prior experience and comfort with technology.

The last question was: "6. What specific recommendations do you have for improving course content and instructional strategies to better prepare students for employment and industry integration?"

1) Interview Review

Zhang Wei emphasized the importance of aligning course development with current industry practices. He suggested that collaborative curriculum design with enterprise partners could enhance content relevance and ensure technical accuracy. Additionally, he advocated for expanding project-based learning modules to give

students opportunities to engage with authentic, industry-aligned tasks that mirror real workplace demands.

Li Fang proposed strengthening interdisciplinary collaboration among teaching staff. She recommended forming cross-disciplinary teaching teams to co-develop and co-deliver integrated instructional units, particularly in areas where industrial problems span multiple technical domains. She also called for greater flexibility in course structures, allowing instructors to adjust content and assessment methods in response to both student needs and evolving technological trends.

Chen Yong highlighted institutional constraints that hinder timely content updates. He advocated for more adaptive curriculum management mechanisms that empower teachers to revise instructional content regularly. Furthermore, he emphasized the importance of cultivating a reflective teaching culture, where educators engage in ongoing peer dialogue and instructional self-assessment to improve teaching quality.

Wang Lan focused on the role of digital technology, noting that while many institutions are investing in digital infrastructure, pedagogical support remains insufficient. She recommended implementing hybrid teaching models that blend online simulations and digital tools with hands-on instruction, especially for skill-intensive subjects. To be effective, such models must be supported by targeted teacher training in digital pedagogy.

Liu Qiang addressed the professional development of early-career teachers. He advocated for a structured mentorship system that pairs novice instructors with experienced mentors, supporting them in areas such as curriculum planning, classroom management, and instructional design. He also proposed the creation of peer-led teaching communities, where teachers can regularly exchange teaching strategies, materials, and feedback.

2) Interview Content Analysis

1. Enhancing curriculum alignment with industry standards

Participants widely emphasized the need to ensure that course content reflects current industrial technologies and processes. Suggestions included

co-developing instructional content with enterprise partners and embedding project-based learning as a core instructional strategy. These measures were seen as crucial for preparing students to meet real-world technical and professional expectations.

2. Encouraging interdisciplinary teaching and curriculum flexibility

Several teachers argued that industrial problems are inherently cross-disciplinary, and thus instructional strategies should reflect this complexity. Proposed solutions included integrated teaching teams, collaborative lesson planning across departments, and flexible curricula that allow real-time adjustments based on emerging industry needs and student feedback.

3. Promoting a reflective and adaptive teaching culture

The importance of institutional support for instructional innovation and professional dialogue was repeatedly mentioned. Teachers advocated for internal systems that facilitate peer observation, lesson sharing, and reflective practice, as these foster a culture of continuous improvement and pedagogical adaptability.

4. Strengthening digital integration through pedagogical training

Although digital tools are increasingly available in vocational education, many participants noted a gap in effective integration. They stressed that institutions should prioritize pedagogical training in digital tools, focusing on how to meaningfully incorporate technology into skill-based teaching rather than simply introducing new platforms.

5. Building mentorship and peer-support systems for early-career teachers

The specific needs of junior faculty members were also addressed. Participants recommended developing formal mentorship programs and peer-led collaborative platforms that provide both technical guidance and emotional support. These systems can play a crucial role in accelerating teacher development and fostering instructional confidence among new educators.

4.4 Summary of the Chapter

This chapter presented and interpreted the findings related to the professional teaching competencies of faculty members in higher vocational colleges in Hubei Province. The analysis was organized around five core dimensions: Knowledge, Skills, Cognitive Potential, Personal Traits and Motivation, and Attitudes and Values. A mixed-methods approach was employed, with quantitative data obtained from structured questionnaires and qualitative insights gathered through semi-structured interviews.

The quantitative results indicated that teachers generally demonstrated moderate to high competency levels across all five dimensions. Among them, the Attitudes and Values Dimension recorded the highest overall mean, suggesting that teachers exhibit strong professional commitment, ethical awareness, and willingness to collaborate. The Skills and Cognitive Potential Dimensions also reflected favorable results, with many teachers showing confidence in instructional design, problem-solving, and data-informed decision-making. However, comparatively lower mean scores were observed in areas such as the integration of digital technologies and interdisciplinary knowledge application, signaling potential gaps that warrant targeted improvement and support.

The qualitative findings from the interviews corroborated the questionnaire results and provided deeper context. Teachers acknowledged a range of challenges, including balancing theoretical instruction with practical training, adapting to curriculum reforms, and aligning teaching content with rapidly evolving industry standards. At the same time, interviewees expressed strong motivation to innovate, highlighting practices such as project-based learning, interdisciplinary collaboration, and the use of educational technology. They also emphasized the critical role of institutional support, enterprise collaboration, and peer mentoring, especially for early-career educators.

Collectively, the findings underscore both the strengths and developmental needs of vocational teachers in the current educational and industrial landscape. These insights set the stage for the subsequent chapter, which will present the conclusions,

discuss the implications of the study, and offer recommendations for practice and future research.

CHAPTER 5
CONCLUSION AND DISCUSSION

This study examined the professional teaching competencies of instructors in higher vocational colleges in Hubei Province, focusing on strengths and areas for improvement across five key dimensions: knowledge, skills, cognitive potential, personal traits and motivation, and attitudes and values. Using a mixed-methods approach, the findings revealed generally moderate to high competency levels, with Attitudes and Values scoring highest, reflecting strong professional commitment and collaboration. However, comparatively lower scores emerged in digital technology integration and interdisciplinary application, suggesting gaps in teachers' capacity to adopt technology-enhanced teaching practices and implement cross-disciplinary instructional approaches effectively. These deficiencies may stem from limited access to ongoing digital training and insufficient integration of industry practices into professional development systems.

The interview data reinforced these findings, emphasizing the importance of authentic learning design, continuous upskilling, and peer collaboration. Teachers expressed a need for better alignment between curricula and industry needs and advocated for increased autonomy in instructional design. These insights highlight the necessity of competency-based professional development strategies that foster both pedagogical innovation and technological adaptability, strengthening vocational instructors' roles as facilitators of high-quality, industry-aligned education.

5.1 Summary of the Research

Table 12 5.1 Summary of Professional Teaching Competencies Across Five Dimensions

Dimension	Mean Score ($\bar{x}$)	Standard Deviation (SD)	Interpretation	Key Insight
Knowledge	3.62	1.27	Agree	Teachers have a solid foundation in subject knowledge but need more confidence in PBL design.
Skills	3.59	1.31	Agree	Instructional skills are well-developed, but collaboration with enterprise partners is weaker.
Cognitive Potential	3.65	1.20	Agree	Strong cognitive adaptability and data-driven decision-making are evident.
Personal Traits and Motivation	3.61	1.37	Agree	Teachers show resilience and initiative but vary in reflective and adaptive practices.
Attitudes and Values	3.57	1.32	Agree	High professional commitment, yet critical thinking facilitation and digital pedagogy need focus.

The study explored the core challenges vocational college teachers encounter in applying their professional teaching competencies. Quantitative results indicated that teachers rated themselves within the "agree" level across all five assessed dimensions, with mean scores ranging from 3.57 to 3.65. Among them, the Cognitive Potential dimension scored the highest ($\bar{x}$ = 3.65, SD = 1.20), indicating strong problem-solving abilities and data-informed decision-making. The Knowledge ($\bar{x}$ = 3.62, SD = 1.27) and Personal Traits and Motivation ($\bar{x}$ = 3.61, SD = 1.37) dimensions also received high mean scores, reflecting teachers' mastery of subject knowledge, reflective capacity, and ability to adapt under pressure. The Attitudes and Values dimension followed closely ($\bar{x}$ = 3.57, SD = 1.32), suggesting a generally positive professional disposition and ethical commitment.

Despite these strengths, the data also highlighted specific areas for improvement. The Skills dimension recorded a slightly lower mean score ($\bar{x}$ = 3.59, SD = 1.31), suggesting that challenges persist in instructional design, assessment development, and the integration of enterprise-driven content. Notably, within this dimension, Item 8, regarding co-developing teaching resources with enterprise partners, received the lowest score ($\bar{x}$ = 3.40), reflecting limited collaboration in authentic curriculum design.

Interview data supported and contextualized these findings. Several participants described practical difficulties in implementing project-based learning, especially in aligning theoretical instruction with industry expectations. One teacher noted, “We can explain theory well, but turning it into a real-world task with industrial complexity is not easy.” In terms of digital pedagogy, many teachers acknowledged the importance of digital platforms but cited insufficient training and uneven support, which limited their ability to design meaningful blended learning experiences.

Although the dimensions of Cognitive Potential and Personal Traits and Motivation demonstrated strong average values, the standard deviations (ranging from SD = 1.20 to SD = 1.37) indicate considerable individual differences. While some teachers reported high self-efficacy in instructional decision-making and innovation, others expressed uncertainty or lacked experience in adaptive instructional methods.

In conclusion, the findings suggest that vocational teachers in Hubei possess solid foundations in knowledge, motivation, and professional values, but still face persistent challenges in translating these strengths into integrated, student-centered, and enterprise-aligned teaching practices. These results highlight the need for more contextualized and sustained professional development—especially in instructional innovation, enterprise collaboration, and digital integration.

5.2 Discussion

This study, based on both questionnaire data and semi-structured interviews, explored the professional teaching competencies of vocational college teachers in

Hubei Province. The findings revealed both strengths and challenges across five core dimensions, offering insights into the current state of vocational teacher development in China.

First, the Knowledge dimension received the highest overall mean score ($\bar{x}$ = 3.62, SD = 1.27), suggesting that teachers generally possess a solid foundation in educational theory, subject knowledge, and interdisciplinary awareness. Items related to interdisciplinary integration ($\bar{x}$ = 3.73) and digital technology application ($\bar{x}$ = 3.67) scored relatively high, though variability remained evident. Interview data confirmed that while teachers valued integrated knowledge, the practical application of such content—particularly in interdisciplinary and project-based contexts—remains underdeveloped. Some noted that while they "understand how to teach with digital tools," they often lack confidence or training in designing truly integrative learning tasks.

The Skill dimension received the lowest overall mean score ($\bar{x}$ = 3.53, SD = 1.27). Despite moderate confidence in curriculum design and instructional implementation, teachers reported difficulties in co-developing materials with enterprise partners ($\bar{x}$ = 3.40) and using digital technologies effectively in varied teaching scenarios. Interviewees echoed these challenges, citing limited real-world collaboration opportunities and institutional inertia in adopting new tools. This aligns with prior findings that vocational instructors often lack structured support for translating technical expectations into daily practice.

In the Cognitive Potential dimension ($\bar{x}$ = 3.63, SD = 1.20), teachers expressed a strong ability to use data for reflective decision-making ($\bar{x}$ = 3.80), with relatively consistent performance in problem-solving and task design. However, high standard deviations in this dimension suggest individual differences in innovation and adaptive teaching. Some teachers described their efforts to refine teaching strategies through trial-and-error, while others emphasized a need for clearer guidance and structured reflection opportunities.

The Personal Traits and Motivation dimension ($\bar{x}$ = 3.61, SD = 1.37) demonstrated teachers' resilience, collaborative spirit, and willingness to improve. Items

concerning pressure management ($\bar{x}$ = 3.69) and continuous learning ($\bar{x}$ = 3.69) received high scores, while reflective practice ($\bar{x}$ = 3.42) scored relatively lower. Interviews reinforced this trend—participants expressed enthusiasm for innovation but often cited insufficient time, policy support, and collaborative platforms as barriers to sustained professional growth.

Finally, the Attitudes and Values dimension ($\bar{x}$ = 3.57, SD = 1.32) reflected strong professional ethics and student-centered values. Teachers reported positive engagement with students and alignment with vocational education goals. However, relatively lower ratings in supporting student autonomy and digital pedagogy ($\bar{x}$ = 3.42–3.47) point to areas needing targeted development.

Overall, the study indicates that while teachers in higher vocational colleges in Hubei Province possess a sound professional foundation and are open to improvement, they still face difficulties in applying interdisciplinary knowledge, designing project-based learning, and utilizing digital resources effectively. To address these gaps, professional development efforts should be embedded in real teaching scenarios, emphasize collaboration with industry, and offer differentiated support tailored to teachers' technological, cognitive, and pedagogical profiles. These reforms are crucial for enabling teachers to meet evolving industry demands and promote student success in applied learning environments.

5.3 Implications of the Study and Recommendations for Teachers

To address the identified gaps in vocational teachers' professional competencies, this study proposes a Four-Pillar Operational Framework that vocational education institutions can adopt as a structured and actionable pathway to enhance teaching effectiveness. The framework integrates practice-oriented training, differentiated professional development pathways, strengthened school-enterprise collaboration, and structured reflection mechanisms to systematically improve teachers' knowledge, skills, and adaptability in rapidly evolving educational and industrial contexts.

Pillar 1: Practice-Oriented and Interdisciplinary Training

Vocational colleges should establish a semester-based training system that emphasizes project-based instruction, interdisciplinary curriculum design, and the integration of digital technologies (e.g., Learning Management Systems such as Moodle and Edmodo, virtual reality simulators, and 3D CAD software). These workshops should use authentic teaching scenarios tailored to vocational education and include collaborative problem-solving tasks. A standardized evaluation mechanism should be implemented to assess training outcomes and ensure teachers can apply new techniques in their classrooms effectively.

Pillar 2: Differentiated Professional Development Pathways

Professional development initiatives should be tailored to teachers' career stages.

New teachers should participate in structured mentorship programs lasting at least one academic year, pairing them with experienced mentors for guidance in lesson planning, classroom management, and assessment practices.

Experienced teachers should receive advanced training on curriculum leadership, data-driven instructional design, and educational research methodologies.

Institutions should conduct regular competency-based assessments to identify individual development needs and create personalized growth plans aligned with institutional goals and industry trends.

Pillar 3: Strengthened School-Enterprise Collaboration

To align vocational education more closely with industry practices, institutions should:

Co-develop curricula with enterprise partners to integrate workplace-relevant skills and technologies.

Offer teacher internships or short-term placements in companies to provide real-world experience and insights into emerging industry requirements.

Invite industry professionals as guest instructors or co-teachers in classrooms to foster industry-education synergy.

Additionally, schools should allocate specific time and resources for curriculum innovation and introduce recognition mechanisms, such as innovation awards and teaching performance incentives, to encourage teachers' active participation in reform initiatives.

Pillar 4: Structured Reflection and Continuous Improvement

Reflection and peer collaboration should be institutionalized as part of the teacher development ecosystem. This can be achieved through:

Peer observation programs and lesson study cycles where teachers collaboratively design, observe, and refine teaching practices.

Expanding access to student analytics systems and providing training on using data to inform instructional decisions and improve learning outcomes.

Supporting cross-institutional communities of practice to foster professional dialogue and promote collective innovation in teaching methodologies.

In conclusion, this operational framework provides vocational colleges with a systematic and practical approach to developing an adaptive, innovative, and industry-responsive teaching workforce. By embedding practice-oriented training, differentiated pathways, strong school-enterprise collaboration, and structured reflection into their teacher development systems, institutions can ensure that their educators are well-equipped to meet the demands of modern vocational education and prepare students for success in dynamic workplace environments.

5.4 Limitations of the Study

This study presents valuable insights into the professional teaching competencies of vocational college teachers. However, several limitations should be acknowledged, and they offer important directions for future research.

1. Limited Sample Scope

The study focused exclusively on teachers from the Faculty of Mechanical Engineering at Ezhou Vocational University. Therefore, the findings reflect the context of a specific academic unit within a single institution. The results may not be

generalizable to teachers from other disciplines, schools, or geographic regions where professional challenges and institutional conditions may differ.

Future research could address this limitation by including multi-disciplinary samples across various vocational colleges in different provinces or countries. Comparative studies could explore cultural and institutional factors affecting teacher competencies and provide more generalizable guidelines for professional development in diverse contexts.

2. Descriptive Analysis Only

The quantitative analysis relied solely on descriptive statistics, including mean scores and standard deviations. While this approach provided an overview of competency patterns, it did not allow for inferential comparisons between different demographic or contextual groups.

Future studies should incorporate inferential statistics (e.g., t-tests, ANOVA) and advanced modeling techniques (e.g., structural equation modeling) to explore relationships among variables and identify predictors of professional competencies. Longitudinal studies could also track changes in teachers' skills over time to inform sustainable development frameworks.

3. Small Qualitative Sample Size

The semi-structured interview sample consisted of a limited number of teachers, which may constrain the depth and breadth of qualitative insights. Although the findings are rich, they may not represent the full range of vocational educators' perspectives.

Future research should expand qualitative sample sizes and integrate perspectives from administrators, students, and industry partners to build a more holistic understanding of teacher competencies. Cross-case analyses could also identify best practices across institutions.

4. Reliance on Self-Reported Data

A key limitation of this study is its dependence on self-assessment through questionnaires, which can be influenced by personal bias or limited self-

awareness. Without observational or performance-based evidence, the findings may not fully reflect actual teaching behavior.

Future studies should consider triangulating data sources, such as classroom observations, peer reviews, and student evaluations, to improve reliability and objectivity. Incorporating tools like teaching portfolios and student performance data can provide a more comprehensive picture. Additionally, experimental designs could test the effectiveness of targeted training interventions on teachers' actual classroom practices.

By addressing these limitations, future research can contribute to developing evidence-based guidelines and practical strategies to enhance vocational teacher competencies, ultimately supporting the quality and relevance of vocational education in rapidly changing industry context

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APPENDIX

Appendix 1

Ezhou University Comprehensive Teacher Evaluation Plan

Notes:

This plan is applied to the evaluation of all teaching staff.

The first table represents the overall evaluation, while subsequent tables correspond to specific sub-items. Scores are calculated proportionally based on the respective weightage.

Ezhou University Comprehensive Teacher Evaluation Table

No.	Indicators	Points	Sub-item Evaluation Scores	Total Sub-item Evaluation Scores
				Sub-item score * Sub-item points / 100
1	Student Evaluation	20		
2	Teacher Self-Evaluation	5		
3	School (or Department) Evaluation Team	26		
4	Teaching and Research	10	Calculated in accordance with the Ezhou University Research Workload Assessment Management System	
5	Teacher and Student Guidance	5		
6	Social Services	4		
7	Program (or Course) Development	10		
8	Laboratory Construction	10		

	Evaluation			
9	Teaching and Research Office Evaluation	10		
	Total	100		

Additional Notes:

Program development evaluation applies only to academic leaders or those responsible for program management.

Course development evaluation applies only to main lecturers.

Laboratory construction evaluation applies only to laboratory directors.

Teaching and research office evaluation applies only to department heads or deputy heads.

In cases where certain indicators are not evaluated, the associated points will not be included in the total score calculation. The actual score for each teacher will be recalculated proportionally using the following formula:

Teacher Evaluation Score = (Sum of scores from all evaluation items) * 100 / (Total points of all evaluated items)

Ezhou University Teacher Teaching (Student) Evaluation Form

Department: Class: Date: Organizer's Signature:

Primary Indicators	No.	Course	Secondary Indicators and Points	Teacher
Teaching Discipline				
26 points	1	Attendance (tardiness, early departure, absenteeism, or abandonment of post) 20 points		
	2	Teaching demeanor (professional, neat		

		appearance) 6 points		
Lesson Preparation				
10 points	3	Teaching objectives (aligned with syllabus, suited to students, specific and clear objectives) 6 points		
	4	Lesson plan design (scientific and reasonable) 4 points		
In-Class Teaching				
47 points	5	Teaching methods (able to motivate student engagement, dynamic and flexible) 10 points		
	6	Teaching content (emphasis on concepts and principles, clear focus on key points and difficulties) 10 points		
	7	Basic teaching skills (concise and fluent language, standard Mandarin; clear and organized board writing) 8 points		
	8	Delivery (strong coherence of knowledge, well-connected teaching stages, proper time allocation) 9 points		
	9	Classroom teaching effectiveness (students can think independently and grasp the basic knowledge taught) 10 points		
Assignment Design and				

Grading				
12 points	10	Assignment design (focus on basic principles, encourage student thinking), grading (serious and timely, fully corrected) 12 points		
Post-Class Guidance				
5 points	11	Student consultation (enthusiastic, patient, focus on student moral education) 5 points		
Total Score	**100 points**			

Notes:

In “Indicator 1,” “abandonment of post” refers to the interruption of regular teaching activities without cause, such as making or receiving phone calls, hosting visitors, etc. Full attendance is rated at 20 points. In cases of no absenteeism but minor attendance issues, rates of 15-12 points will be given. For sporadic absenteeism, 6-4 points will be assigned. Frequent absenteeism will be rated at 2-0 points.

For "Indicator 2" through "Indicator 11," students are asked to score the teacher based on the degree of performance: excellent, good, average, or poor. Please evaluate the teacher’s performance in each criterion honestly and objectively, and calculate the final score.

Teacher Self-Assessment Evaluation Form

Teacher's Name: Title: Class Taught: Course Title: Date of Completion:

No.	Item Name	Points	Sub-Items and Points	Score
1	Teaching and	10	1. Emphasizes both teaching and mentorship – 4	

	Mentorship		points	
			2. Serves as a professional role model – 4 points	
			3. Shows care and concern for students – 2 points	
2	Teaching Progress	10	1. Has a teaching plan and completes over 85% of it – 10 points	
			2. Deduct 1-5 points if less than 85% of the teaching plan is completed	
3	Attendance	12	1. Deduct 0.5 points for each instance of personal leave	
			2. Deduct 0.2 points for each instance of sick leave	
			3. Deduct 0.5 points for each instance of tardiness	
			4. Deduct 0.5 points for each instance of early departure	
			5. Deduct 2 points for each unexcused absence	
4	Lesson Plan	10	1. Well-structured lesson plan (no incorrect characters) – 10 points	
			2. Deduct 1-5 points for lesson plans that do not meet requirements	
			3. Absence of lesson plan – 0 points	
5	Classroom Teaching	18	1. Excellent classroom teaching effectiveness – 16-18 points	
			2. Good classroom teaching effectiveness – 14-15 points	
			3. Average classroom teaching effectiveness – 10-12 points	
			4. Poor classroom teaching effectiveness – 0-10 points	

6	Assignments	10	1. Assignments graded thoroughly and according to guidelines – 10 points	
			2. Assignments graded adequately – 8 points	
			3. Assignments given but not graded – 2 points	
			4. No assignments given – 0 points	
7	Tutoring and Consultation	5	0.5 points per session, maximum of 5 points	
8	Class Observation	5	1 point per observation, maximum of 5 points	
9	Examination	10	1. Participated in the preparation of exam questions in accordance with the requirements – 3 points	
			2. Responsible and diligent invigilation – 4 points	
			3. Thorough and responsible grading – 3 points	
10	Teaching and Research Activities	10	1. Participated in teaching and research activities with recognized teaching effectiveness at the school level – 10 points	
			2. Deduct 1 point per absence from regular research activities without valid reason	

Course Instructor Evaluation Form (School or Department Evaluation Group)

Teacher's Name: Title: Class Taught: Course Title: Evaluation Date:

Primary Indicators	Secondary Indicators	Tertiary Indicators	Score
Teacher Ethics and Conduct (10 points)	Professional Integrity and Political Commitment (2 points)	Strong sense of commitment and responsibility. Full score: 2 points.	

	Teaching Discipline (5 points)	Punctual for class, meetings, and maintains professional duties. Full score: 5 points. Attendance is strictly enforced, and deductions are made based on the self-evaluation standard until the full 5 points are deducted.	
	Attitude Towards Students (3 points)	Firm yet supportive. Full score: 3 points.	
Teaching Attitude (30 points)	Appearance (4 points)	Neat and professional. Full score: 4 points.	
	Lesson Preparation (5 points)	Lessons are prepared in advance, with well-organized and clear lesson plans. Full score: 5 points.	
	Classroom Teaching (8 points)	Instructs with diligence, following the teaching plan and procedure. Full score: 8 points.	
	Assignment Design and Grading (5 points)	Timely and carefully graded. Full score: 5 points.	
	Tutoring (4 points)	Enthusiastic and patient, provides both guidance and discipline. Full score: 4 points.	
	Examinations (4 points)	Prepares exam questions, grades, and invigilates diligently, meeting all required standards. Full score: 4 points.	
Teaching Proficiency (30 points)	Explanation of Basic Content (8 points)	Scientifically sound, correct, and accurate. Full score: 8 points.	

	Explanation of Key and Difficult Points (8 points)	Emphasizes key points, accurately addresses difficult topics, in line with students' developmental levels. Full score: 8 points.	
	Theory and Practice Integration (4 points)	Clearly explains complex concepts, helps students systematically build their knowledge base, and makes learning engaging. Full score: 4 points.	
	Teaching Methods (5 points)	Flexible, diverse, innovative, and able to engage students actively. Full score: 5 points.	
	Basic Teaching Skills (5 points)	Well-organized, effectively manages the classroom environment; accurate, clear language, structured and organized board work, effective in answering questions. Full score: 5 points.	
Teaching Effectiveness (20 points)	Student Examination Performance (8 points)	Top third in terms of achievement rate and pass rate compared to other teachers of the same subject, with no disciplinary violations. Full score: 8 points.	
	Student Academic Performance (7 points)	Knowledge acquisition, skill development, and moral character rank above average. Full score: 7 points.	
	Social Practice Activities (5 points)	Demonstrates measurable social impact. Full score: 5 points.	
Teaching Workload (10 points)	Teaching Workload	Full points (10) for exceeding workload expectations. If below the required workload, the score is calculated as the actual workload divided by the required	

		workload, multiplied by 10.	
Total	100 points		

Instructor and Student Evaluation Form

Primary Indicators	Secondary Indicators	Tertiary Indicators	Score
Attitude and Ideology (20 points)	Political Ideology and Teacher Ethics (10 points)	Exemplifies both teaching and moral integrity. Full score: 10 points.	
	Commitment to Teaching Responsibilities (10 points)	Proactively takes on responsibilities, diligent and accountable. Full score: 10 points.	
Instructor Supervision (40 points)	Educational Background of Junior Faculty (6 points)	Bachelor's, associate, and technical school qualifications score 6 points, 4 points, and 2 points, respectively.	
	Political Thought and Work (6 points)	Cares for the growth and well-being of junior faculty, helps resolve their challenges. Full score: 6 points.	
	Teaching Work (6 points)	Guides junior faculty in lesson preparation, class observation, evaluation, and teaching demonstration; junior faculty show noticeable improvement. Full score: 6 points.	
	Internship and Graduation Design Supervision (6	Supervises junior faculty in internships and graduation design	

	points)	projects, ensuring junior faculty are competent in their roles. Full score: 6 points.	
	Teaching Research and Paper Writing (10 points)	Guides junior faculty in teaching research and academic paper writing, enabling them to perform relevant work. Full score: 10 points.	
	Mentorship Record (6 points)	Keeps monthly mentorship records. Full score: 6 points.	
Student Supervision (40 points)	Number of Students Supervised (8 points)	Exceeds the assigned number of students for supervision. Full score: 8 points.	
	Student Academic Performance (7 points)	Students' academic achievements rank below the class average, but improvement is evident. Full score: 7 points.	
	Student Ideological and Behavioral Progress (7 points)	Significant improvement in students' thinking and behavior. Full score: 7 points.	
	After-Class Tutoring Frequency (8 points)	Provides tutoring sessions once a week. Full score: 8 points.	
	Mentorship Record (10 points)	Keeps monthly records of discussions with students. Full score: 10 points.	
Student Disciplinary Deductions	1. Deductions based on the severity of student disciplinary actions. 2. If the total deductions exceed the teacher's	Warning: 10 points deducted. Severe Warning: 20 points deducted. Demerit: 40 points deducted. Probation: 60 points deducted. Expulsion: 80 points deducted.	

	earned score, deduct only up to the total earned points.		

Social Service Activities Evaluation Form

Primary Indicators	Secondary Indicators	Tertiary Indicators	Score
Activity Records (30 points)	Activity Plan (10 points)	Feasible activity plan. 5 points. Most aspects have been implemented. 5 points.	
	Activity Summary (10 points)	Extracted experiences have been promoted. 5 points. Identified problems have been resolved. 5 points.	
	Activity Frequency (5 points)	3 or more activities. 5 points. Fewer than 3 activities. 3 points.	
	Total Participants (5 points)	More than 20 participants. 5 points. Fewer than 20 participants. 3 points.	
Organizer and Co-organizer (40 points)	Main Organizer (40 points)	National-level organizing unit. 40 points. Provincial/ministerial-level organizing unit. 30 points. City-level organizing unit. 20 points.	
	Co-organizer (20 points)	National-level co-organizer. 20 points. Provincial/ministerial-level co-organizer. 15 points. City-level co-organizer. 10 points.	

Activity Benefits (30 points)	Social Impact (20 points)	Creates a positive cultural atmosphere and brings honor to Ezhou University. 20 points.	
	Economic Benefits (10 points)	Generates measurable economic benefits. 10 points.	

Professional Program Construction Evaluation Form

Primary Indicators	Secondary Indicators	Tertiary Indicators	Score
Program Construction Plan (30 points)	Program Development Concept (15 points)	Presents a scientific, reasonable, and standardized program development concept. 15 points.	
	Teaching Plan (8 points)	Has a professional teaching plan and adheres to it. 8 points.	
	Talent Development (7 points)	The development goals and standards align with market demand. 7 points.	
Program Conditions (30 points)	Faculty (15 points)	Professional full-time teachers meet the qualification standards. 4 points. Lab/internship instructors meet the qualification standards. 3 points. There is a faculty development plan in place, and it is being implemented. 4 points. The school organizes educational research to enhance teacher qualifications. 4 points.	

	Teaching Facilities (5 points)	Facilities meet teaching needs. 5 points.	
	Textbooks and Library (10 points)	Uses advanced and appropriate textbooks. 4 points. Encourages teachers to compile textbooks. 3 points. There is a plan for professional library development, and it is being implemented. 3 points.	
Teaching Process (20 points)	Classroom Teaching (8 points)	The structure of teaching qualifications aligns with requirements. 3 points. 100% of courses taught by senior teachers. 2 points. Uses modern educational technology to improve teaching efficiency. 3 points.	
	Practical Teaching (6 points)	Full compliance with 100% teaching experiment rate. 3 points. Conducts market research to adjust teaching content and internship requirements. 3 points.	
	Teaching Reform (6 points)	Has a teaching reform plan, organizes faculty to engage in reform activities. 3 points. Achieved results in teaching reform. 3 points.	
Teaching Management and Effectiveness (20	Teaching Management (5	Complete teaching documents and systems, with strict adherence to	

points)	points)	management standards. 5 points.	
	Teaching Effectiveness (15 points)	Good classroom teaching results, students grasp the knowledge presented. 5 points. 85% or more of students pass the professional exams. 5 points. Student practice and innovation skills show notable improvement. 5 points.	

Course Construction Evaluation Form

Primary Indicators	Secondary Indicators	Tertiary Indicators	Score
Infrastructure (20 points)	Course Construction (4 points)	A course construction plan is in place and has been effectively implemented. 4 points.	
	Teaching Conditions (16 points)	Complete teaching records. 4 points. Teaching syllabi, textbooks, and reference materials are standardized and well-coordinated. 4 points. Necessary teaching instruments and equipment are available and regularly used in instruction. 4 points. Laboratory construction meets teaching requirements. 4 points.	
Faculty (20 points)	Faculty Development (6 points)	A faculty development plan is established and has been implemented with tangible results. 6 points.	

	Teaching Team (8 points)	The age structure of the teaching team is appropriate. 3 points. At least 80% of the faculty hold degrees above the bachelor's level. 3 points. The faculty's professional rank structure is balanced. 2 points.	
	Academic Team (6 points)	There are designated academic leaders. 2 points. There is a core team of academic leaders. 2 points. A strong group of faculty experts is established. 2 points.	
Teaching Process and Management (40 points)	Teaching Preparation (4 points)	Teaching plans are developed on time, standardized, and effectively executed. 2 points. Complete lesson plans (teaching notes) are prepared and teaching content is regularly updated. 2 points.	
	Classroom Teaching (8 points)	Various forms of classroom teaching are utilized, and classroom usage is maximized. 4 points. Teaching methods are flexible, and classroom engagement is high. 4 points.	
	Experiential Learning (4 points)	The laboratory experiment opening rate reaches 100%, or corresponding experiential learning is provided. 4 points.	
	Assignments (2 points)	Assignments are carefully prepared, regularly graded, and reviewed with	

		feedback. 3 points.	
	Examinations (4 points)	Exams are unified with consistent setting, grading standards, and detailed analysis. 4 points.	
	Extracurricular Activities (6 points)	Academic lectures related to course content are actively organized. 3 points. Extracurricular study guidance (or extracurricular interest group activities) is provided. 3 points.	
	Teaching Management (3 points)	Class attendance and teaching inspections are conducted regularly, with documented records. 3 points.	
	Teaching Discipline (3 points)	Teaching practices are standardized; instructors are familiar with students' progress, enforce high standards, and proactively engage in instruction. 3 points.	
	Teaching Effectiveness (3 points)	Teaching effectiveness aligns with planned outcomes. 3 points.	
Teaching Research and Academic Level (20 points)	Teaching Research Activities (10 points)	Teaching research activities are conducted regularly, and teaching reform efforts yield measurable results. 10 points.	
	Academic Level (10 points)	Research projects are established and have made significant academic progress. 10 points.	

Teaching and Research Office Evaluation Form

Primary Indicators	Secondary Indicators	Tertiary Indicators	Score
Political Ideology (10 points)	Political Study (5 points)	Political study activities are organized and documented. 5 points.	
	Political Thought Work (5 points)	Political thought work is regularly conducted and documented. 5 points.	
System and Planning (30 points)	System (15 points)	There is a system for political study. 3 points. There is a system for academic activities. 3 points. A system for teaching inspections and analysis is in place. 3 points. There is a system for teacher performance evaluation. 3 points. The democratic life system is established. 3 points.	
	Teaching and Research Office Development Plan (8 points)	The office development plan is feasible and forward-thinking. 8 points.	
	Work Plan (Semester/Annual) (7 points)	Long-, medium-, and short-term plans facilitate implementation and evaluation. 7 points.	
Educational and Teaching Research (40 points)	Teaching Research Activities (20 points)	Self-compiled textbooks, teaching guides, and syllabi are available. 6 points. Class observation and evaluation activities are organized. 8 points. Teachers are organized to study	

		educational theories and explore new teaching methods. 6 points.	
	Practical Teaching Components (12 points)	Management of lab staff is strengthened. 6 points. Student activities and courses are organized and managed effectively. 6 points.	
	Research (8 points)	Teachers engage in educational research, leading to improved academic outcomes. 8 points.	
Teaching Routine Management (20 points)	Teaching Inspection (5 points)	Inspections of lesson preparation, teaching, tutoring, internships, experiments, and thesis guidance are conducted with documented records. 5 points.	
	Teacher Performance Evaluation (5 points)	Teacher performance evaluations are consistently documented. 5 points.	
	Course Evaluation (5 points)	Courses rated as satisfactory receive 5 points.	
	Teaching Records (5 points)	Teaching records are complete and standardized. 5 points.	

Laboratory Construction Evaluation Form

Primary Indicators	Secondary Indicators	Tertiary Indicators	Score
Laboratory Structure and Management (20 points)	Laboratory Development Plan and Recent Work Plan (4	Development plans are forward-looking and feasible. 4 points.	

	points)		
	Laboratory Construction Summary (4 points)	The plan is implemented, and developmental ideas are integrated. 4 points.	
	Management Structure and Effectiveness (8 points)	Leadership responsibilities are defined, with dedicated personnel for management. 2 points. A hierarchical management system is implemented. 2 points. Computer-based management is applied. 4 points.	
	Regulations (4 points)	Comprehensive regulations ensure effective management. 4 points.	
Laboratory Teaching (40 points)	Laboratory Textbooks and Guides (6 points)	Laboratory textbooks and guides are complete and updated. 6 points.	
	Experiment Opening Rate (8 points)	The experiment opening rate reaches 90%. 8 points.	
	Completion of Experimental Teaching Tasks (8 points)	Experimental teaching tasks are completed according to plan. 8 points.	
	Experimental Exam and Assessment Methods (6 points)	Exam and assessment methods for experiments are implemented and well-documented. 6 points.	
	Experimental Research Results (12 points)	Experimental research plans, designs, and summaries are in place. 6 points. Experiment reports are written,	

		reviewed, and corrected. 6 points.	
Laboratory Equipment (20 points)	Equipment Management (15 points)	Equipment records match inventory accurately. 5 points. Equipment maintenance and upgrades meet teaching requirements. 5 points. No equipment is damaged due to human error. 5 points.	
	Laboratory Equipment Procurement Plan (5 points)	The procurement plan meets teaching requirements. 5 points.	
Laboratory Environment and Safety (20 points)	Laboratory Equipment and Environment (10 points)	The laboratory is clean and well-maintained, with protective measures in place. 10 points.	
	Laboratory Safety Measures (10 points)	Safety measures are practical and effectively implemented. 10 points.	

Appendix 2

Survey on the Professional Teaching Capabilities of Teachers at the School of Mechanical Engineering, Ezhou Vocational University

Dear Teacher,

Greetings! This questionnaire is designed to assess the current state of the professional teaching capabilities of teachers at the School of Mechanical Engineering, Ezhou Vocational University, with specific attention to the integration of theory and practice in mechanical engineering education. We sincerely appreciate your participation. The results of this survey will be used exclusively for research purposes and will not be applied for any other use. Please rest assured when completing the survey. We wish you success in your work!

Part 1: Basic Information (Please check "√" where applicable)

1. Your gender:

☐ Male

☐ Female

2. Your age:

☐ Under 30

☐ 30-40

☐ 40-50

☐ Over 50

3. Your academic title:

☐ Assistant Lecturer

☐ Lecturer

☐ Associate Professor

☐ Professor

4. Your years of teaching experience:

☐ Less than 5 years

☐ 6-10 years

☐ 11-15 years

☐ 16-20 years

☐ Over 21 years

5. Your highest degree:

☐ Bachelor's

☐ Master's

☐ Doctorate

Part 2: Questionnaire

Dimension		2	3	4	5
Knowledge Dimension	I understand and apply project-based teaching models that integrate enterprise case studies and real industry tasks.				
	I have mastered foundational knowledge in education, psychology, and pedagogy, and can link it to vocational learning contexts.				
	I can systematically apply subject-specific knowledge to support job-relevant teaching scenarios.				
	I am familiar with interdisciplinary knowledge structures and can incorporate cross-domain knowledge to enhance teaching effectiveness.				
	I can flexibly apply core disciplinary knowledge to address industry-oriented teaching challenges.				

	I understand how digital technologies (e.g., big data, AI, IoT) are applied in modern industry and can integrate these into my teaching.				
Skill Dimension	I can design project-based teaching activities that reflect real enterprise processes and professional tasks.				
	I can co-develop teaching materials and tools in collaboration with enterprise partners to support authentic learning.				
	I can effectively integrate digital technologies into industry-relevant teaching practices.				
	I can structure subject knowledge to support interdisciplinary and application-driven learning.				
	I can adapt and reorganize knowledge content to develop modular, competency-based teaching units.				
	I conduct teaching research that addresses real student needs and complex problems arising from workplace scenarios.				
	I can innovate teaching content based on enterprise expectations and the technical features of my subject.				
	I can design practical, competency-based assessment tools that reflect industry standards.				
	I create opportunities for students to apply knowledge in real or simulated work settings, enhancing practical skills.				
	I analyze learning data to inform ongoing teaching improvement and optimize alignment with industrial expectations.				
Cognitive Potential Dimension	I design exploratory teaching strategies that reflect authentic, complex enterprise problems.				

	I adapt instructional methods based on iterative reflection cycles and feedback from real teaching and industry scenarios.				
	I recognize the value of data generated in practice and use it to guide evidence-based teaching decisions.				
	I can identify optimal teaching solutions under uncertain or complex instructional conditions.				
	I can analyze and reconstruct knowledge frameworks to build effective, task-based instructional plans.				
	I guide students to identify core problems in complex contexts and apply logical thinking to resolve them.				
	I critically evaluate information and generate creative instructional strategies responsive to vocational challenges.				
Personal Traits and Motivation Dimension	I consistently reflect on my teaching practices and adjust strategies to better align with student and enterprise feedback.				
	I collaborate actively with colleagues and industry mentors to co-develop innovative, project-based teaching solutions.				
	I am able to remain composed and adaptable under teaching pressures or unexpected real-world disruptions.				
	I independently identify areas for improvement and engage in continuous professional learning linked to industry trends.				
Attitudes and Values Dimension	I set ambitious teaching goals that aim to develop both technical and employability skills in my students.				
	I proactively engage in collaboration with both educational				

	peers and enterprise stakeholders.				
	I regularly reflect on teaching outcomes and actively implement strategies for targeted instructional improvement.				
	I have a strong commitment to continuous learning and integrating relevant digital technologies in my pedagogy.				
	I foster students' ability to analyze complex problems, promoting critical thinking and self-directed learning.				
	I guide students to challenge assumptions and build independent, critical attitudes essential for workplace success.				
	I uphold professional ethics, demonstrate empathy, and support students' emotional and developmental needs.				

Appendix 3

1. How do you balance the transmission of theoretical knowledge with the cultivation of students' practical skills in the teaching process? Are there any specific modifications or innovative strategies you have implemented to enhance students' practical abilities?

2. Have you participated in course design or teaching methodology reforms? What were the major challenges you encountered during this process? Can you provide an example of a successful teaching reform and explain how you addressed the issues you faced?

3. What innovative teaching methods have you employed in your teaching practice? What specific impact have these methods had on students' learning outcomes and engagement? How do you assess the effectiveness of these methods?

4. Regarding the enhancement of teaching competencies, do you consider the training and support provided by the institution or enterprise to be adequate? How has this support benefited your teaching practice? In which areas do you think further strengthening is necessary?

5. With the rapid changes in industry technology and market demand, in what areas do you believe the current teaching content and methods are deficient?

6. What specific recommendations do you have to improve course content and teaching strategies in order to better enhance students' practical skills and employability?

Appendix 4

Twenty Basic Guidelines for Vocational Education

Vocational education is a crucial pathway for cultivating high-quality technical talents. To ensure the quality and effectiveness of vocational education, the following twenty basic guidelines have been established:

1. Adaptation to Market Needs: Vocational education must closely align with market demands and adjust training programs promptly based on changes in the labor market.

2. Balance of Knowledge and Skills: Emphasize both theoretical knowledge and practical skills, ensuring students develop a comprehensive competence in both domains.

3. Optimization of Teaching Faculty: Vocational education institutions must maintain a high-quality teaching workforce and continuously strive to enhance teachers' professional competencies.

4. Strengthening Practical Instruction: Integrate education with real work environments, emphasizing the development of students' hands-on skills and practical abilities.

5. Enrichment of Practical Training: Expand practical training components for students, enhancing their ability to apply knowledge and develop vocational competence.

6. Scientific Curriculum Design: Design curriculum subjects and allocate teaching hours based on the specific characteristics and needs of various fields.

7. High-Standard Teaching Facilities: Provide advanced teaching equipment and experimental facilities to support students' practical training requirements.

8. Enhancing School-Enterprise Cooperation: Establish and maintain close partnerships with enterprises to collaboratively promote talent cultivation efforts.

9. Comprehensive Student Development: Focus on the holistic development of students, encompassing moral, intellectual, physical, and aesthetic education to cultivate well-rounded professionals.

10. Career Planning and Guidance: Offer career planning consultations and guidance to assist students in formulating their professional development plans.

11. Promotion of Innovation and Entrepreneurship: Foster students' awareness and capabilities in innovation and entrepreneurship, encouraging them to become drivers of economic and technological development.

12. Recognition of Industry Credentials: Recognize industry-related certifications and qualifications to improve students' employability.

13. Clear Differentiation of Educational Levels: Clearly define the objectives and requirements for various levels of vocational education.

14. Support for Job Transition and Retraining: Provide retraining and continuing education opportunities to support employees in career development and job transitions.

15. Ensuring Educational Equity: Distribute vocational education resources equitably, ensuring that all individuals have access to quality education opportunities.

16. Evaluation of Teaching Quality: Implement a scientific system for evaluating teaching quality to continuously enhance instructional standards.

17. Development of Professional Associations: Encourage student participation in relevant professional associations to broaden their professional networks and perspectives.

18. Career Development Services: Provide career development services that assist students in transitioning smoothly into the professional world.

19. International Collaboration and Exchange: Strengthen collaboration with international vocational education institutions to support the global integration of vocational education.

20. Adherence to Laws and Regulations: Ensure compliance with relevant laws and policies governing vocational education to maintain legal and ethical standards.

These twenty basic guidelines provide a framework for the development of vocational education, promoting students' comprehensive growth and enhancing their vocational competencies.

VITA

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