
Faculty Development in Higher Vocational Education in China: A Survey

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Abstract

This survey paper examines faculty development within the dual system of vocational education in China, emphasizing the integration of theoretical learning with practical training to meet industry demands. The study highlights the critical role of faculty development in enhancing educators' skills and adaptability, focusing on career adaptability, digital competencies, and innovative educational practices. It underscores the need for a unified strategy, drawing insights from the European VET model, to address productivity challenges and improve educational outcomes. The survey identifies significant challenges, including regulatory and cooperation barriers, technological competency gaps, and the misalignment of curricula with labor market needs. It advocates for internationalization and industry cooperation as pivotal components in advancing faculty development, fostering a more comprehensive understanding of global educational standards. Additionally, the paper calls for future research to enhance comparative studies in VET, develop standardized assessment tools, and explore innovative teaching methodologies. By adopting a holistic approach that integrates theoretical and practical training, aligns with industry needs, and fosters international cooperation, the survey suggests that substantial improvements in vocational education's effectiveness and sustainability in China can be achieved.

1 Introduction

1.1 Contextualizing Faculty Development

Faculty development is essential for enhancing higher vocational education in China, acting as a catalyst for educational reform and quality improvement. The shifting economic landscape demands a transition to a personality-based education model, equipping educators to meet the challenges of a rapidly changing economy [1]. This model emphasizes individualized teaching approaches aligned with industry needs, thereby elevating the quality of vocational education.

The field of environmental art and design reveals significant gaps in graduates' practical skills, highlighting the necessity for targeted faculty development initiatives [2]. By promoting an integrated approach to theoretical and practical training, these programs can enhance graduates' employability.

Despite the proliferation of faculty development programs, there is a lack of research assessing their effectiveness and impact on teaching and learning [3]. Addressing this gap is crucial for designing programs that genuinely enhance educational outcomes. Additionally, as online teaching becomes more prevalent, understanding faculty perceptions and experiences is vital to developing effective professional development programs that improve both instructor and student satisfaction [4]. By focusing on these areas, faculty development can significantly advance the dual system of vocational education in China.

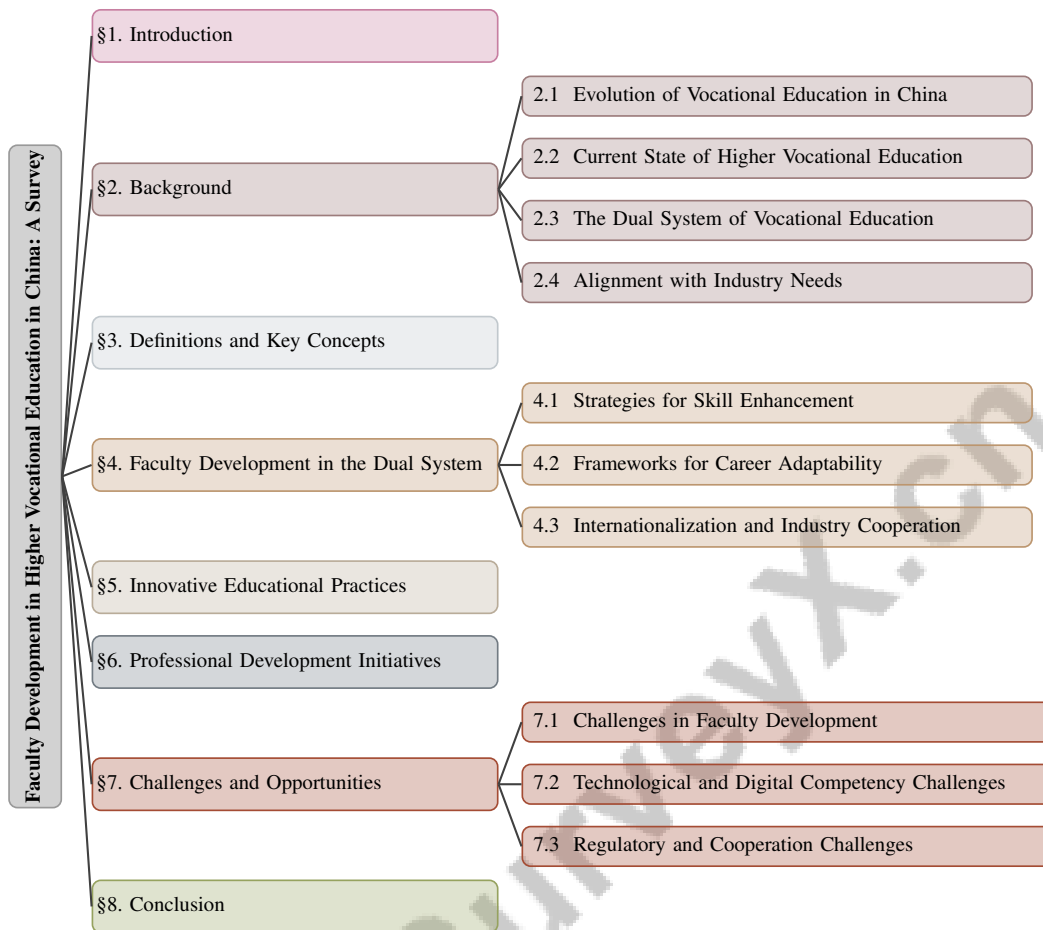


Figure 1: chapter structure

1.2 Importance of Dual System

The dual system of vocational education is pivotal in shaping faculty development in higher vocational education in China, integrating theoretical learning and practical training to prepare educators for a dynamic labor market. This system bridges the gap between academic instruction and industry requirements, enhancing the quality and relevance of vocational training [5].

Career adaptability and vocational identity are crucial for faculty development, enabling educators to align their teaching practices with industry standards [6]. By cultivating these attributes, faculty development initiatives ensure that educators can effectively integrate school-based learning with workplace experiences, a central tenet of the dual system [7].

Moreover, the dual system's emphasis on collaboration between educational institutions and industry partners necessitates a comprehensive approach to faculty development that includes both pedagogical skills and industry-specific knowledge. This integration not only enhances vocational educators' competencies but also boosts the overall effectiveness and sustainability of vocational education by fostering a skilled workforce that meets global economic demands. This approach reflects international trends in educational systems, emphasizing coherent program structures and stakeholder collaboration to optimize training outcomes [7, 5].

1.3 Themes of Educational Innovation and Professional Development

Exploring educational innovation and professional development is vital for understanding faculty development in higher vocational education in China. These themes are particularly relevant in the context of Education 4.0, which emphasizes integrating advanced technologies and cultivating 21st-century skills to meet Industry 4.0 demands [8]. This paradigm shift requires an inclusive

approach to education, ensuring that educators possess the competencies necessary to implement these innovations effectively.

Educational innovation involves adopting new pedagogical strategies and integrating digital technologies to enhance teaching and learning outcomes. The COVID-19 pandemic has accelerated the need for innovative practices, prompting a reevaluation of traditional methods and the adoption of flexible, adaptive approaches. By incorporating evidence-based strategies, faculty development programs can foster a culture of continuous improvement, effectively addressing emerging educational challenges and adapting to the evolving higher education landscape. This approach not only enhances faculty satisfaction and professional growth but also positively influences student learning outcomes and institutional practices, as evidenced by recent research on faculty development effectiveness and transformative learning experiences [9, 10, 4, 3].

Professional development focuses on the ongoing enhancement of educators' skills and knowledge to improve teaching effectiveness and student outcomes. The effectiveness of faculty development programs is a critical area of inquiry, directly impacting organizational practices and the overall quality of education [3]. By addressing these themes, the survey aims to provide a comprehensive analysis of the current state of faculty development in China, highlighting key focus areas that can drive future improvements in vocational education.

1.4 Structure of the Survey

This survey on faculty development in higher vocational education in China is meticulously structured to provide a comprehensive analysis of the current landscape, challenges, and opportunities within this domain. The survey begins with an **Introduction**, presenting the significance of faculty development in the context of the dual system of vocational education and highlighting the themes of educational innovation and professional development. This section sets the stage for the subsequent detailed exploration of these themes.

Following the introduction, the **Background** section offers an in-depth overview of higher vocational education in China, tracing its historical evolution and current state, with a particular focus on the dual system's role in aligning educational practices with industry needs. This section provides the necessary context for understanding the challenges and opportunities in faculty development.

The **Definitions and Key Concepts** section clarifies the core terms related to faculty development, educational innovation, and digital competence, establishing a common framework for the discussions that follow. This foundational understanding is crucial for analyzing the strategies and practices explored in later sections.

The survey then delves into **Faculty Development in the Dual System**, examining the specific role of faculty development in enhancing educators' skills and adaptability within the dual system framework. This section also explores internationalization and industry cooperation as pivotal elements in faculty development.

In the **Innovative Educational Practices** section, the survey highlights successful initiatives and innovative teaching methods implemented to support faculty development. The role of school-enterprise cooperation and the impact of Education 4.0 on student engagement are also discussed, emphasizing the need for adaptive and forward-thinking educational practices.

The subsequent **Professional Development Initiatives** section discusses various initiatives aimed at improving vocational training, focusing on enhancing digital competencies and the benefits of international academic visits and tailored development programs.

Finally, the **Challenges and Opportunities** section identifies key challenges in faculty development, such as technological and regulatory issues, and discusses potential opportunities for future improvement. The survey concludes with a **Conclusion**, summarizing the key findings and proposing recommendations for future research and practice, thereby providing a holistic view of faculty development in higher vocational education in China. The following sections are organized as shown in Figure 1.

2 Background

2.1 Evolution of Vocational Education in China

Vocational education in China has experienced substantial reforms from 2004 to 2020, aimed at synchronizing workforce preparation with economic demands. These reforms include increased financial support, which constituted over 66% of vocational colleges' revenue by 2020, and a diversified framework merging vocational and academic education [11, 12, 1, 13]. Decentralization has led to regional disparities, with provincial authorities often overseeing institutions that draw high-achieving students. Efforts to improve training quality and foster educational-industry collaboration underscore a commitment to resolving labor market skill mismatches. Nevertheless, establishing a cohesive framework to address diverse market needs remains challenging.

Historically, China's vocational education system has been fragmented, lacking integration of theoretical and practical training [13]. This fragmentation has impeded workforce development essential for economic growth. The absence of comparative perspectives and cohesive frameworks further complicates benchmarking and enhancing vocational practices [1]. International models, such as the Netherlands' dual system, offer insights for reforming China's vocational education by integrating academic instruction with practical skills [14].

2.2 Current State of Higher Vocational Education

Higher vocational education in China currently suffers from an imbalance between theoretical instruction and practical skills, resulting in graduates with inadequate competencies for the workforce [2]. This imbalance is due to curricula that prioritize theory over practical experience. Global influences, including the Bologna Process and neoliberal policies, exacerbate employability challenges and socio-economic tensions as institutions strive to meet labor market needs [14]. These trends highlight the need for an integrated approach aligning educational outcomes with industry expectations.

The rise of technology and online teaching adds complexity to vocational education. Faculty perceptions reveal that institutional and personal factors impact online teaching effectiveness, with student engagement being a critical concern [4]. Addressing these issues requires strategic interventions to balance theoretical knowledge with practical training, adopt ability-based education models, and integrate technology into curricula. Collaboration between educational institutions and industry partners is crucial for ensuring training programs meet evolving demands for technical skills, thereby enhancing vocational education's quality and recognition [1, 5, 13, 11, 2].

2.3 The Dual System of Vocational Education

The dual system is pivotal in bridging theoretical instruction and practical skills in China's higher vocational education. By combining school-based learning with work-based training, it enhances graduates' employability by aligning skills with industry standards [5]. Its success depends on integrating school and workplace environments, yet challenges persist in aligning objectives and methodologies [7]. Continuous dialogue between educational institutions and industry is necessary to maintain training relevance.

Career adaptability is vital within the dual system, aiding students in navigating the workforce. However, research on career adaptability, especially regarding apprentices' experiences, is limited [6]. Expanding research in this area is essential for supporting students' transitions from education to employment, contributing to the dual system's sustainability and success.

2.4 Alignment with Industry Needs

Aligning vocational training with industry needs is crucial for enhancing the effectiveness of higher vocational education in China. Despite the dual system's framework for integrating theory and practice, a significant gap persists between educational outcomes and labor market demands. This gap is exacerbated by outdated teaching methods and inadequate teacher training, leading to skill mismatches and high turnover among graduates [1, 11]. Surveys underscore the need for reforms to enhance productivity and align VET programs with industry requirements [5].

The skills gap is further widened by insufficient alignment with Industry 4.0's technological and competency demands [8]. Addressing these challenges requires strengthening practical teaching and student engagement through innovative curricula [2]. Improved communication and collaboration between educators and industry trainers are essential to address perceptions of incoherence among graduates [7]. Additionally, the regional focus of VET practices complicates comprehensive evaluation and alignment efforts [13].

3 Definitions and Key Concepts

The integration of faculty development in vocational education is crucial for fostering both personal and professional growth among educators. Targeted development initiatives significantly enhance educators' digital competencies and pedagogical skills, thereby transforming the educational landscape and improving student outcomes. Frameworks such as the European Framework for Digital Competence (DigCompEdu) and components of Education 4.0 provide effective approaches to empower educators and align educational practices with the demands of the 21st-century learning environment [10, 4, 9, 15, 8].

Figure 2 illustrates the hierarchical structure of integrating faculty development in vocational education, emphasizing the interconnections between faculty development and professional growth, educational innovation and technology integration, and digital competence and online teaching. Each primary category is further delineated into key areas and strategies, underscoring the significance of targeted initiatives, digital competencies, and ongoing professional development in enhancing educational outcomes within the context of vocational education. This visual representation complements the discussion by providing a structured overview of the essential components necessary for effective faculty development.

3.1 Faculty Development and Professional Growth

Faculty development is essential for enhancing professional growth in higher vocational education in China, addressing systemic inadequacies that hinder the production of a workforce equipped with practical skills and a strong vocational identity [1]. By fostering adaptability and vocational identity, these initiatives prepare educators to meet evolving labor market demands [6]. A unified VET strategy aligns faculty development with labor market demands, enhancing educators' competencies in integrating school-based learning with work-based training [5, 7].

As illustrated in Figure 3, the key areas in faculty development and professional growth focus on enhancing competencies, addressing staff shortages in specialized fields, and leveraging international experiences for transformative learning. Targeted programs address the shortage of qualified teaching staff in specialized fields like environmental art and design [2], improving employability outcomes [14]. International experiences also play a significant role in faculty development, leading to transformative learning outcomes [10].

3.2 Educational Innovation and Technology Integration

Educational innovation and technology integration are pivotal in transforming higher vocational education in China, particularly within the Education 4.0 framework. This paradigm shift requires educators to adopt new pedagogical strategies and integrate digital technologies to enhance teaching and learning outcomes [8]. The framework by Gonzalez et al. emphasizes digital competencies, innovative pedagogical approaches, and stakeholder involvement. Digital competence is essential for educators to navigate the increasingly digital landscape, allowing them to effectively utilize technology to engage students [9]. The European framework for digital competences outlines six key areas: Professional Engagement, Digital Resources, Teaching and Learning, Assessment, Empowering Learners, and Facilitating Learners' Digital Competence [15]. These frameworks emphasize competencies vital for Industry 4.0, including lifelong learning and problem-solving abilities, ensuring inclusive and equitable education, particularly in light of challenges posed by the COVID-19 pandemic [8, 12, 9, 15].

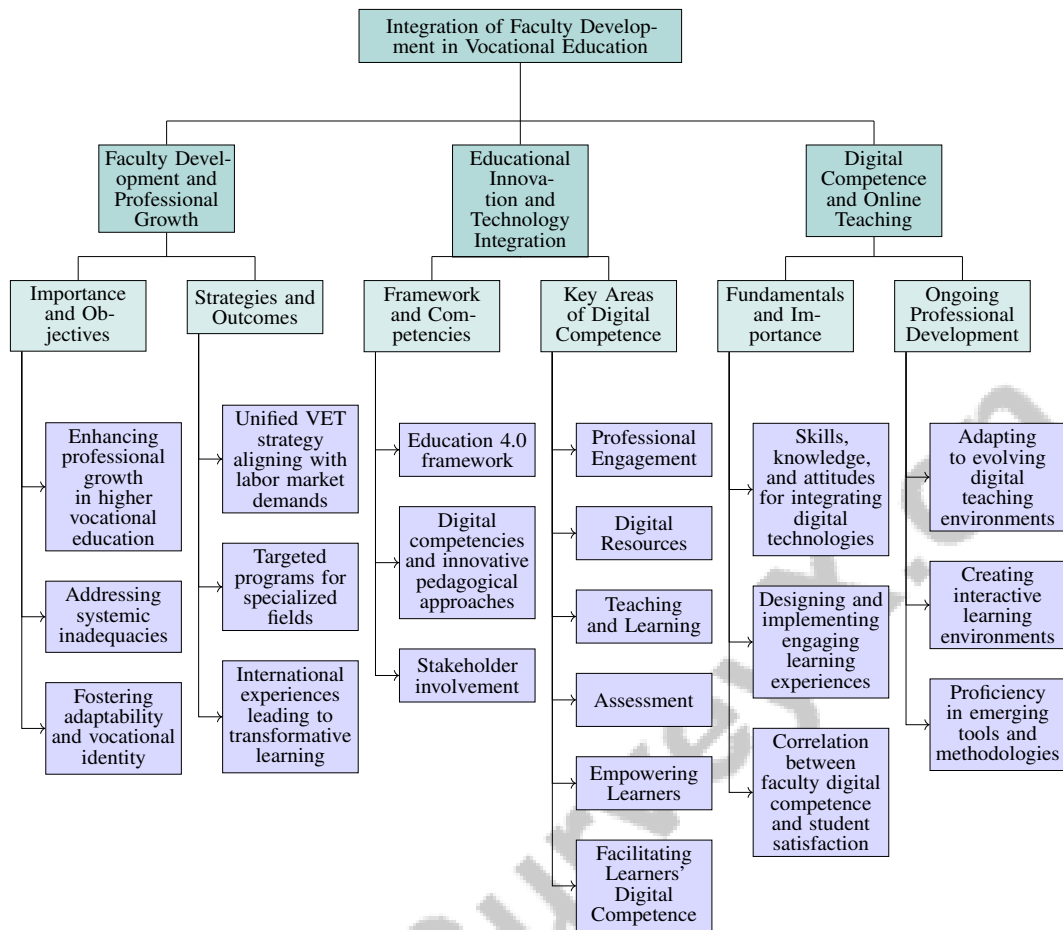


Figure 2: This figure illustrates the hierarchical structure of integrating faculty development in vocational education, focusing on faculty development and professional growth, educational innovation and technology integration, and digital competence and online teaching. Each primary category is further broken down into key areas and strategies, highlighting the importance of targeted initiatives, digital competencies, and ongoing professional development in enhancing educational outcomes in the context of vocational education.

3.3 Digital Competence and Online Teaching

Digital competence is fundamental to modern educational practices, especially in online teaching. It encompasses the skills, knowledge, and attitudes necessary for educators to effectively integrate digital technologies into their practices, enhancing both teaching and learning outcomes. The global shift towards online learning underscores the importance of digital competence [9]. The European framework for digital competences outlines key areas such as Professional Engagement, Digital Resources, Teaching and Learning, Assessment, Empowering Learners, and Facilitating Learners' Digital Competence [15]. These areas emphasize the need for educators to engage with digital tools for instructional purposes and professional development. In online education, digital competence enables educators to design and implement engaging learning experiences, navigate various digital tools, and adapt to the evolving demands of a digital teaching environment. The European Framework for the Digital Competence of Educators (DigCompEdu) stresses the importance of digital skills across educational levels, supporting educators in assessing their competencies and identifying training needs. Recent studies indicate a correlation between faculty digital competence and student satisfaction, emphasizing the need for targeted professional development in digital skills to enhance teaching effectiveness and student engagement in online settings [9, 4, 15, 8, 12]. Educators must adeptly use digital resources to create interactive learning environments that cater to diverse learning needs, involving the selection of appropriate digital tools, designing digital content,

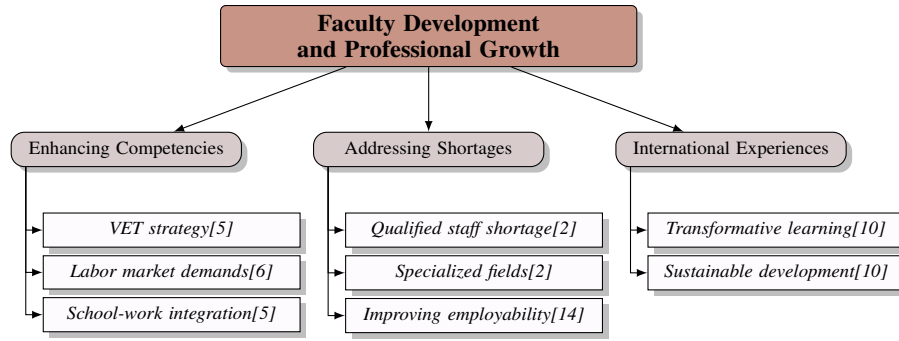


Figure 3: This figure illustrates the key areas in faculty development and professional growth, focusing on enhancing competencies, addressing staff shortages in specialized fields, and leveraging international experiences for transformative learning.

and implementing innovative assessment methods. Moreover, the rapid advancement of digital technologies necessitates ongoing professional development for educators to remain proficient in emerging tools and methodologies, ensuring they can adapt to changing educational landscapes and meet their students' evolving needs [9].

4 Faculty Development in the Dual System

4.1 Strategies for Skill Enhancement

In China's dual vocational education system, enhancing skills necessitates a seamless blend of theoretical and practical training aligned with industry requirements. A collaborative framework among stakeholders is paramount to establish a unified skill set for vocational education and training (VET), which effectively addresses workforce demands [5]. A key framework categorizes career adaptability into concern, control, curiosity, and confidence, guiding educators in fostering resilience and adaptability within a dynamic educational landscape [6].

Integrating Education 4.0 components into teaching practices has shown to boost student engagement and competency development [8]. Equipping educators with digital skills fosters interactive learning environments, and future research should focus on personalized training plans, incorporating digital competencies into teacher training, and exploring collaborative professional development networks [9]. These initiatives are vital for enhancing educators' capabilities to effectively integrate technology into their pedagogy.

Strengthening communication and collaboration between educational institutions and workplaces bridges the gap between academic instruction and practical application, thereby improving vocational training quality [7]. Innovative school-enterprise cooperation frameworks, such as embedding industry projects into curricula, further enrich student learning and ensure alignment with industry needs [2]. As illustrated in Figure 4, these main strategies for skill enhancement in vocational education emphasize collaborative frameworks, the integration of Education 4.0 components, and school-enterprise cooperation.

The personality-based education model emphasizes individual trait and skill development, tailoring educational methods to better meet industry requirements [1]. This personalized approach enables educators to address diverse student needs, cultivating a more adaptable and skilled workforce.

Research underscores strengths in faculty development programs, such as high satisfaction rates and positive post-development changes [3]. However, challenges persist regarding the effectiveness of online communication tools and varying faculty experience levels, impacting satisfaction and engagement [4]. Addressing these issues is crucial for refining skill enhancement strategies.

4.2 Frameworks for Career Adaptability

Career adaptability frameworks are crucial for preparing educators in China's dual vocational education system to meet labor market demands. Career adaptability encompasses the readiness and

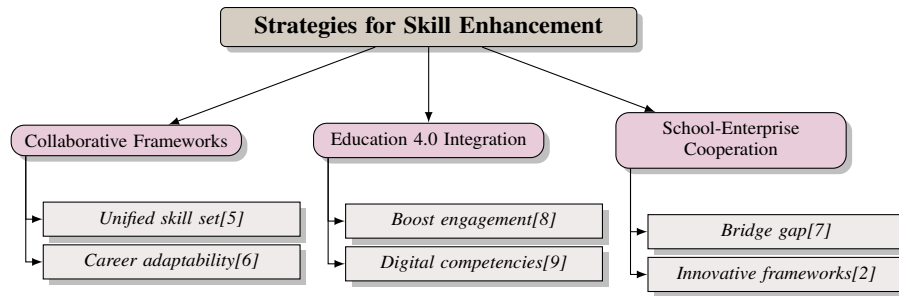


Figure 4: This figure illustrates the main strategies for skill enhancement in vocational education, emphasizing collaborative frameworks, integration of Education 4.0 components, and school-enterprise cooperation.

resources individuals need to manage current and future tasks and transitions in their roles [6]. This adaptability is essential for educators to continuously align their teaching methods with evolving industry and socio-economic needs.

A prominent framework divides career adaptability into concern, control, curiosity, and confidence [6]. These dimensions encourage educators to adopt a proactive approach to professional growth, with concern involving future planning, control focusing on self-regulation, curiosity promoting exploration, and confidence aiding in overcoming challenges. Cultivating these attributes enhances educators' adaptability, ensuring the effective delivery of relevant vocational education.

Incorporating digital competencies into career adaptability frameworks is essential, given the increasing reliance on technology in education and industry [9]. Proficiency in digital tools allows educators to implement innovative teaching practices and engage students effectively, aligning with Education 4.0's emphasis on technology integration [8].

International experiences significantly enhance educators' career adaptability by providing new perspectives and skills applicable to their teaching practices, fostering a culture of continuous learning and professional growth [10]. Incorporating international best practices better equips educators to prepare students for the global workforce, enhancing the effectiveness of vocational education in China.

4.3 Internationalization and Industry Cooperation

Internationalization and industry cooperation are pivotal for advancing faculty development in China's dual vocational education system. Integrating international perspectives into vocational education and training (VET) provides insights into diverse educational practices and cooperation models, enriching the understanding of global educational standards [13]. This international dimension enhances the educational experience and equips educators with the skills needed to adapt to global industry trends.

The transformative impact of international experiences on faculty development is notable, facilitating cognitive, emotional, and practical changes among educators [10]. Exposure to international practices encourages the adoption of innovative teaching methodologies and broadens pedagogical approaches, thereby enhancing professional growth and aligning teaching with global industry standards.

Effective industry cooperation is vital for ensuring vocational education remains relevant to labor market needs. The framework of positive coordination emphasizes the simultaneous consideration of production and distribution issues in vocational education cooperation [11]. This alignment of educational objectives with industry requirements ensures graduates possess the necessary skills for successful workforce integration.

Fostering strong partnerships between educational institutions and industry partners addresses skill mismatches prevalent in the labor market. Such cooperation facilitates knowledge and resource exchange, enabling educators to stay updated on industry advancements and incorporate them into teaching practices. This alignment not only enhances graduates' employability through relevant skill development but also improves the overall effectiveness and sustainability of vocational education in China, contributing to a robust and well-funded vocational education system [11, 12, 1, 2].

5 Innovative Educational Practices

5.1 Innovative Approaches to Teaching

Advancing faculty development within China's dual vocational education system necessitates innovative teaching approaches that integrate technology and novel pedagogical strategies to enhance student engagement and educational outcomes. Educators must align teaching strategies with industry demands to equip students with essential skills for navigating a complex labor market. Frameworks like the European Framework for the Digital Competence of Educators (DigCompEdu) highlight the importance of digital competence, advocating for continuous professional development to meet the dynamic needs of students and employers [9, 15].

Technology integration in vocational training is pivotal, fostering interactive learning environments that enhance critical thinking, creativity, and problem-solving skills, thus aligning with Industry 4.0 requirements [1]. Innovative methods emphasize personalized learning experiences, adopting a personality-based education model to tailor approaches to individual student needs and industry requirements [1]. This personalization enhances workforce adaptability and vocational education's effectiveness.

Future research should delve into innovative teaching methods and technology integration to boost student engagement and outcomes. Faculty development programs must foster continuous improvement and adaptability, supporting sustainable professional growth through international experiences, as demonstrated by transformative outcomes from visiting scholar initiatives. These programs should also promote better integration of school- and work-based learning, creating a cohesive educational experience that equips students with workforce competencies and addresses communication and collaboration gaps among educators and workplace trainers [7, 10].

5.2 School-Enterprise Cooperation

School-enterprise cooperation is crucial for practical teaching enhancement within China's dual vocational education system. This collaboration bridges the gap between academic instruction and industry requirements, ensuring vocational training aligns with workforce needs. Partnerships between educational institutions and industries provide students with hands-on experiences that complement theoretical learning, significantly boosting employability and readiness for industry challenges. Effective dual vocational education and training (VET) systems rely on integrating school-based and work-based learning for improved competency development and smoother workforce transitions [7, 11, 13].

Collaborative vocational education projects enhance skill matching and reduce training costs for companies, aligning educational programs with labor market needs and addressing skill mismatches that impede graduates' workforce transitions [11]. In environmental art and design programs, school-enterprise cooperation is particularly vital, allowing industry-specific projects to be incorporated into curricula, enabling students to apply learning in real-world settings [2].

Addressing the gap between theoretical knowledge and practical skills, school-enterprise cooperation enhances vocational education's practical component. This collaboration aligns curricula with industry needs, fostering comprehensive training programs and real-world experiences that enhance employability. Integrating industry input into curriculum design and establishing practical training bases better prepares students for job market demands, cultivating a skilled and competent workforce [11, 2, 5, 12]. Strengthening these partnerships ensures educational programs remain relevant and responsive to industry needs, contributing to a skilled and adaptable workforce.

5.3 Education 4.0 and Student Engagement

Education 4.0 represents a transformative shift in educational paradigms, driven by advanced technology integration and the need to equip students with skills relevant to Industry 4.0. This concept emphasizes creating an adaptive, personalized educational environment aligned with the rapidly evolving technological landscape [8]. Core components include digital competencies, innovative pedagogical approaches, and active stakeholder involvement, crucial for enhancing student engagement and learning outcomes.

Incorporating digital technologies within Education 4.0 facilitates interactive learning environments tailored to diverse student needs. Digital tools enable educators to design personalized learning experiences that cultivate critical thinking, creativity, and problem-solving skills, boosting student engagement and preparing them for technological advancements in their careers [9]. The European framework for digital competences guides educators in enhancing digital literacy and effectively integrating technology into teaching practices [15].

Education 4.0 emphasizes collaborative learning, positioning educators as facilitators within a student-centered framework. This approach fosters essential 21st-century skills and addresses challenges posed by Industry 4.0 and social issues exacerbated by the COVID-19 pandemic. By integrating innovative teaching strategies and emphasizing active learning, educators equip students with competencies necessary for lifelong learning and effective problem-solving in a rapidly changing world [8, 12, 9, 15]. Adopting innovative teaching methods and integrating technology into curricula cultivates a dynamic, responsive learning environment that encourages active student participation and engagement, aligning with Education 4.0's broader objectives to produce a skilled, adaptable workforce for the evolving global economy.

6 Professional Development Initiatives

Professional development initiatives are pivotal in enhancing educators' competencies within China's dual vocational education system. Collaborative projects between academic institutions and industry partners facilitate the practical application of theoretical knowledge and ongoing professional growth. These initiatives equip educators with essential digital competencies, aligning educational practices with labor market demands and enhancing vocational education quality, as emphasized by the European Framework for the Digital Competence of Educators (DigCompEdu) [12, 9, 15].

6.1 Collaborative Vocational Education Projects

Collaborative vocational education projects are integral to professional development within China's dual vocational education system. These partnerships align educational practices with labor market needs, enhancing students' practical skills through hands-on experiences and equipping educators with contemporary digital competencies and effective teaching methodologies, as outlined in frameworks like DigCompEdu. This dual benefit supports Education 4.0's goals, preparing learners and educators for evolving workforce demands [8, 7, 9, 15].

These projects address educators' and students' specific needs, with tailored faculty development initiatives improving online teaching satisfaction and competency integration [4]. Collaborative efforts facilitate knowledge exchange between educational institutions and industry partners, keeping educators current with industry advancements. This alignment enhances graduates' employability, cultivates a skilled workforce, and fosters career adaptability and vocational identity—critical for modern job markets. Effective integration of school- and work-based learning experiences ensures graduates acquire requisite skills to meet evolving industry demands, contributing to a coherent vocational education and training system [7, 6, 9, 5].

6.2 Enhancing Digital Competencies

Enhancing digital competencies is crucial for faculty development within China's dual vocational education system. The growing reliance on digital technologies requires robust training programs and pedagogical support to equip educators with skills to integrate these technologies into teaching practices. Improved training programs focused on enhancing digital competencies, particularly in evaluation practices, are essential for effective student learning assessment in digital environments [9].

A significant challenge is the lack of a unified framework synthesizing national and regional efforts, leading to inconsistencies in digital competence development [15]. Establishing a comprehensive framework aligned with the European framework for digital competences, which outlines key areas such as Professional Engagement, Digital Resources, and Teaching and Learning, is imperative [15]. Integrating digital competencies into faculty development programs enhances teaching effectiveness and aligns with Education 4.0's goals, emphasizing advanced technology integration in education [8].

Fostering digital literacy among educators creates interactive and engaging learning environments, preparing students for technological advancements in the workforce.

6.3 International Academic Visits and Tailored Development Programs

International academic visits and tailored development programs are crucial for enhancing faculty professional development within China's dual vocational education system. These initiatives expose educators to diverse educational practices and global industry standards, fostering a deeper understanding of international pedagogical approaches applicable to the Chinese context. International academic visits significantly contribute to sustainable professional development, underscoring the need for ongoing support and opportunities [10].

Beyond exposure to new teaching methodologies, international visits facilitate transformative learning experiences, enhancing educators' cognitive, emotional, and practical skills. Engaging with international peers and participating in cross-cultural exchanges broadens pedagogical perspectives and encourages adopting innovative teaching strategies aligned with global trends. International experiences and professional development initiatives enhance the educational environment, providing essential digital competencies and adaptive skills to meet dynamic global labor market requirements, as highlighted by recent studies on transformative learning and career adaptability in higher education [10, 6, 9, 4].

Tailored development programs focus on educators' specific needs, offering customized training and professional growth opportunities. These programs enhance competencies in digital literacy, curriculum design, and industry collaboration. Integrating school-based and work-based learning ensures educators navigate the evolving vocational education landscape, improving instruction quality and preparing students for modern workforce demands. Frameworks like DigCompEdu provide structured guidance for skill assessment, training needs identification, and professional development engagement, fostering a coherent and effective educational experience [7, 9, 15]. Aligning these programs with institutional goals and individual career aspirations fosters a culture of continuous professional development supporting faculty members' long-term growth and adaptability.

7 Challenges and Opportunities

7.1 Challenges in Faculty Development

Faculty development in China's dual vocational education system encounters several significant challenges that affect its efficacy and alignment with labor market needs. A major issue is the lack of coherence in vocational education and training (VET) programs, which creates communication barriers between educational institutions and workplaces, leading to a misalignment of skills taught with industry requirements and impacting graduate employability [7]. The scarcity of empirical research on career adaptability in vocational education, particularly for apprentices, further complicates the development of strategies to enhance adaptability among educators and students [6].

Curricular inadequacies, emphasizing theoretical knowledge over practical skills, result in a shortage of qualified teaching staff with industry-relevant experience [2]. Moreover, the integration of modern technologies into curricula is often overlooked, leading to stagnation and an inability to keep pace with rapid technological advancements [1]. The implementation of Education 4.0 is hampered by unmet infrastructural and technological needs, obstructing efforts to foster digital literacy and competence [8].

Uncertainty in mutual commitments between companies and students challenges effective collaboration within the dual system [11], potentially undermining trust and commitment essential for successful vocational training programs. Additional challenges include imbalanced funding, inadequate academic guidance, and difficulties adapting to culturally diverse environments, which impede the effectiveness of international visits vital for faculty development [10].

In the Netherlands, restructuring higher education has improved mobility and degree recognition but also poses challenges for MBO graduates concerning employability and social inequality [14]. Addressing similar issues in China's vocational education system is crucial to ensure equitable opportunities for graduates.

Many studies on faculty development rely on self-assessment, which may not accurately reflect actual competence levels [9]. This reliance highlights the need for comprehensive training programs that provide objective assessments and targeted development opportunities. Additionally, low satisfaction with communication tools and perceived lack of student engagement indicate the necessity for improved communication strategies and enhanced student involvement in vocational education [4].

7.2 Technological and Digital Competency Challenges

Technological and digital competency challenges within China's dual vocational education system present significant barriers to effectively integrating digital technologies in teaching. Studies highlight regulatory ambiguities and unstable cooperation agreements that often lead to unsustainable outcomes in vocational education partnerships [11]. These uncertainties hinder the development of a coherent framework for integrating digital competencies into vocational curricula, affecting educational quality.

The predominance of self-assessment studies reveals low to medium digital competence levels among teachers [9], underscoring the urgent need for comprehensive training programs tailored to educators' specific needs. The absence of such programs results in varying levels of digital proficiency, impeding effective technology use in educational settings.

Future research should focus on refining the DigCompEdu framework, which provides a structured approach to developing digital competencies among educators [15]. Exploring innovative methods for integrating these competencies into teacher training programs will equip faculty members with necessary skills to leverage digital tools effectively. Targeted faculty development initiatives must address the specific needs of less experienced instructors while fostering collaboration among faculty members [4]. These efforts are crucial for enhancing digital literacy and promoting effective technology use in vocational education.

7.3 Regulatory and Cooperation Challenges

Regulatory and cooperation challenges significantly obstruct effective faculty development within China's dual vocational education system. A major issue is the insufficient integration of learning experiences, creating regulatory hurdles that impede the alignment of educational objectives with industry requirements [7]. This lack of integration can lead to discrepancies in training methodologies and educational goals, ultimately affecting the coherence and effectiveness of vocational training programs.

Research highlights gaps in understanding career adaptability within vocational training, indicating regulatory challenges in addressing unique adaptation needs [6]. These gaps suggest that current regulatory frameworks may inadequately support the development of career adaptability among educators and students, which is crucial for navigating rapidly changing labor market demands.

Moreover, the focus on certain countries in existing literature may overlook valuable insights from underrepresented regions, limiting the understanding of regulatory and cooperation challenges in faculty development [12]. This narrow focus can result in a lack of comprehensive strategies to address the diverse needs of educators and students across various contexts.

8 Conclusion

The investigation into faculty development within China's higher vocational education system underscores the critical need for a unified approach to addressing productivity challenges, drawing insights from the European VET model. This model provides a foundation for developing integrated frameworks that empower educators and administrators to improve educational outcomes. A notable insight is the shift towards a personality-based education model in vocational training, crucial for enhancing the quality and employability of graduates in a competitive job market.

Future research should focus on conducting comparative studies in vocational education and training (VET) to address existing gaps in the literature and explore new trends in global VET collaboration. Moreover, the creation of standardized assessment tools for practical skills and the development of innovative teaching methodologies to boost student engagement are essential areas for further exploration. Thorough evaluations and rigorous research methodologies are also imperative for

advancing faculty development and gaining a deeper understanding of its impact on teaching and learning outcomes.

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