



A BIBLIOMETRIC AND VISUAL ANALYSIS OF RESEARCH ON DUAL-QUALIFIED TEACHERS IN CHINESE HIGHER VOCATIONAL EDUCATION USING CITESPACE (2015–2025)

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Abstract:

This study conducts a bibliometric and visual analysis of research on dual-qualified teachers in Chinese higher vocational education from 2015 to 2025, aiming to uncover theoretical foundations, development trends, and competency-performance linkages. In the field of medical and health-related vocational education, the demand for dual-qualified teachers—those who combine theoretical knowledge with practical industry experience—is especially pressing. However, existing research remains fragmented, lacks performance-based evaluation frameworks, and does not fully address the specific demands of the healthcare sector. Given the localized institutional background of dual-qualified teachers in China, this study analyses literature published between 2015 and 2025 using the CNKI database. CiteSpace 6.3.R1 was employed to visualize knowledge structures through keyword co-occurrence, author collaboration networks, institutional mapping, and thematic evolution. Classical competency frameworks such as the Iceberg Model and the Onion Model are integrated with performance theories including Expectancy Theory, Social Comparison Theory, and Goal-Setting Theory to develop an analytical framework tailored to the specific demands of the research context. The findings reveal five core competency dimensions: knowledge, skills, professional ethics, personal traits, and motivation. These are aligned with two performance dimensions—outcome-based (teaching quality, research, enterprise practice) and conduct-based (professional ethics). Three key trends are identified: (1) growing alignment between competency standards and performance metrics since 2020, driven by national policy reforms; (2) fragmented author networks reflecting limited academic consolidation; and (3) concentration of research within provincial-level institutions, with limited cross-regional collaboration. By combining

bibliometric analysis with theoretical synthesis, this study not only highlights the intellectual trajectory of dual-qualified teacher research in China but also proposes a comprehensive, performance-linked competency framework. The results offer theoretical foundations and practical implications for competency assessment, policy development, and teacher training in the context of medical vocational education.

Keywords:

Dual-Qualified Teachers, Teacher Competency, Performance, Cite Space, China

Introduction

As China accelerates its transition toward a skills-driven economy, Chinese medical vocational colleges (CMVCs) are playing an increasingly prominent role in training healthcare professionals. In this context, greater emphasis is being placed on practical competence in the medical and health sectors. To cultivate professionals who are both theoretically grounded and technically proficient, the development of a highly qualified teaching workforce is essential—particularly dual-qualified teachers who possess strong academic teaching abilities alongside substantial industry experience. These teachers play a pivotal role in bridging the gap between academic instruction and practical application, supporting students in making a smooth transition from the classroom to the demands of the workplace (S. Wei et al., 2022; M. Zhang et al., 2024).

In recent years, the Ministry of Education has introduced a series of policy documents that further clarify the standards for identifying, training, and evaluating dual-qualified teachers. The 2022 directive titled Notice on the Recognition of Dual-Qualified Teachers in Vocational Education stipulates that such educators must possess solid teaching capabilities, technical expertise, and relevant industry experience (MoE, 2022). These policy developments have drawn growing attention from the academic community to the competency structure of dual-qualified teachers, particularly regarding how specific competency elements influence their teaching performance within vocational education settings (Deng & Pan, 2024; L. Wei, Wang, & Huo, 2023).

Although a growing number of scholars have explored the relationship between dual-qualified teachers' competencies and teaching performance, significant gaps remain in the existing literature. Many studies tend to treat competency and performance as separate constructs, with limited integration between competency models and performance evaluation frameworks. Moreover, research specifically focused on the medical vocational education sector remains limited, with much of the current work failing to address the unique contextual demands and regulatory frameworks of medical vocational colleges (W. Zhang, Zhang, & Liu, 2023). Most existing competency models are adapted from general vocational education systems or corporate human resource frameworks, lacking empirical validation and contextual adaptation within the specific settings of vocational teaching (Gao, 2021; Y. Q. Liu, 2023).

To address the gaps noted above, this paper undertakes a systematic review of the literature on dual-qualified teachers in Chinese higher vocational institutions, drawing on Chinese and international studies published between 2015 and 2025. The study aims to:

1. Identify and classify prevailing competency dimensions relevant to dual-qualified teachers.
2. Examine the conceptual and empirical linkages between competency and performance.
3. Analyze evolving research trends using CiteSpace bibliometric visualization.
4. Propose implications for competency-based performance appraisal and teacher development.

This study reviews nearly a decade of literature in the relevant field, contributing to a deeper understanding of professional development among vocational education teachers. It also provides a theoretical foundation for developing more targeted evaluation frameworks for faculty in medical vocational colleges. The insights generated may further inform future empirical research and policy formulation aimed at improving educational quality and strengthening the alignment between talent cultivation and labor market demands.

Literature Review

To gain a deeper understanding of how the competencies of dual-qualified teachers in higher vocational institutions influence their performance, it is essential to examine how these competencies have been defined, categorized, and assessed in existing literature. This section synthesizes key theoretical models and empirical studies on dual-qualified teacher competencies, with a particular focus on frameworks relevant to vocational and healthcare education. By comparing internationally recognized paradigms with localized practices in China, the review establishes a theoretical foundation for developing context-specific competency models. The final section highlights research gaps and introduces the methodological approach used in the bibliometric analysis that follows.

Theoretical Foundations of Competency in Dual-Qualified Teachers

The notion of teacher competency has evolved from early behavioral definitions to multidimensional models integrating knowledge, skills, values, and psychological dispositions. McClelland (1973) first argued for competency-based approaches to replace intelligence tests in predicting job performance. Later, Spencer and Spencer (1993) Iceberg Model categorized competencies into visible (skills and knowledge) and underlying (motives, traits, self-image) domains. These models emphasize that genuine competency extends beyond observable behaviors to include deeper attributes that guide decision-making in complex professional contexts.

In China's vocational education system, three prevailing interpretations of dual-qualified teachers have emerged: (1) those holding both a teaching qualification and an industry-recognized certificate; (2) those with formal teaching experience complemented by substantial practical experience; and (3) professionals actively engaged in both educational and industry sectors (Xu & Sarino, 2023). Among these, practical competence has become a central benchmark, as vocational education increasingly emphasizes hands-on ability, workplace readiness, and responsiveness to industry demands (H. J. Wei et al., 2021; Yang, 2022). Teaching competency is no longer confined to pedagogical ability but includes workplace integration, enterprise collaboration, and professional adaptability (Boyatzis, 1982; Korthagen & Koster, 2014). This dual expectation is particularly salient in medical vocational colleges, where clinical realities must inform classroom teaching and students' technical skills must meet real-world healthcare standards (Li, 2024).

Comparative Models of Teacher Competency: Global and Chinese Perspectives

Globally, teacher competency models have emphasized various dimensions, including instructional ability, student engagement, technological proficiency, and ethical practice (Darling-Hammond, 2000; OECD, 2013). For example, the Tuning Educational Structures project in Europe promoted outcome-based frameworks focusing on learning-centered teaching. UNESCO's Asia-Pacific report on digital citizenship emphasizes that teacher innovation capacity, including cultural adaptability and research skills, is crucial for fostering students' digital competencies and resilience (UNESCO, 2023).

In China, vocational education reforms have accelerated efforts to localize competency standards for dual-qualified faculty. L. Cao et al. (2023) proposed a three-dimensional framework focusing on teaching skills, moral integrity, and service to society. J. Y. Liu and Li (2021) expanded this to include research ability and industry-experience-based teaching strategies. However, few of these models provide empirical validation specific to Medical Vocational Colleges, despite the unique challenges these institutions face in combining healthcare knowledge, clinical practice, and student mentorship.

Theoretical Framework Linking Competency to Performance

To gain a deeper understanding of how teacher competencies translate into actual job performance, a solid theoretical foundation is essential. Within the research context of dual-qualified teachers at CMVCs, a range of classical psychological and organizational theories provides valuable perspectives and theoretical support for examining the intrinsic connection between these two constructs.

Expectancy Theory (Vroom, 1964) posits that individuals are motivated to perform based on their expectations of success and the perceived value of the outcome. In the teaching context, this theory suggests that dual-qualified teachers are more likely to exert effort and enhance performance when they believe that their competencies can lead to meaningful educational results, professional recognition, or career advancement. The alignment between perceived efficacy and expected reward becomes a motivational driver.

Goal-Setting Theory (Locke & Latham, 2002) suggests that clear, specific, and appropriately challenging goals can effectively enhance individual performance. In the context of CMVCs, competency-based objectives—such as improving clinical teaching or enhancing student employability—serve not only to guide teachers' professional behaviour but also to provide concrete reference points for evaluating performance. This strengthens the connection between capacity building and actual outcomes.

Social Comparison Theory (Festinger, 1954) offers a useful perspective for examining how teachers assess their own performance in relation to colleagues. In the context of dual-qualified teachers, comparisons between those with and without industry experience can significantly impact motivation, perceived self-efficacy, and career development paths. Teachers who view themselves as lagging behind peers may either become discouraged and disengaged or actively pursue targeted improvements to enhance their competencies and professional standing.

Performance Management Theory (Aguinis, 2019) brings together key elements such as goal clarity, performance feedback, and evaluation mechanisms, emphasizing the construction of competency-based assessment systems. In the context of CMVCs, establishing evaluation

criteria that incorporate specific competency dimensions helps align teacher development with institutional priorities in teaching, research, and community service, thereby reinforcing the synergy between individual capability and organizational outcomes.

These theoretical perspectives not only frame the conceptual relationship between competency and performance but also serve as an analytical lens for interpreting the empirical trends revealed in the following section.

Developing a Localized Competency Framework for Medical Vocational Education

Although existing models provide important insights, they often fail to fully reflect the performance demands and contextual realities faced by dual-qualified teachers in CMVCs. While foundational competency models such as the Iceberg Model (Spencer & Spencer, 1993) and the Onion Model (Korthagen & Vasalos, 2005) provide robust theoretical structures, they often require contextual adaptation for effective application in CMVCs. Several scholars have attempted to develop models that reflect the unique demands placed on dual-qualified teachers in China.

For instance, R. Cao (2020) developed a competency framework that emphasized teaching abilities, professional identity, and practical innovation capacity, specifically in the vocational context. Similarly, Y. Liu and Men (2021) proposed a model encompassing pedagogical knowledge, professional ethics, and real-world clinical experience as core dimensions. Other scholars, such as Wang (2019), have focused on integrating “school-enterprise cooperation” and “technical service ability” into competency criteria. Similarly, Deng and Pan (2024) argue that competency models for CMVCs must integrate not only teaching and clinical expertise but also “bridging capabilities”—the ability to translate industry standards into educational content and vice versa. This highlights the dual-role identity of such teachers: as educators and as practice-based experts.

Drawing on both international and domestic literature and grounded in theoretical models such as the Iceberg Model and the Onion Model, this study proposes a five-dimensional competency framework—referred to as the KSEPM model—tailored specifically to the context of CMVCs. The framework comprises five core components. Knowledge (K) refers to both subject-matter expertise and pedagogical content knowledge essential for effective instruction. Skills (S) encompass instructional techniques, clinical or professional practice abilities, and digital literacy relevant to modern vocational education. Professional Ethics (E) involve adherence to ethical standards, alignment with institutional values, and a strong commitment to educational responsibilities. Personal Traits (P) include attributes such as effective communication, teamwork, adaptability, and a capacity for innovation. Motivation (M) reflects both intrinsic drivers—such as a sense of mission and student-centered values—and extrinsic incentives, including opportunities for career development and professional recognition.

Table 1: The KSEPM Competency Framework For Dual-Qualified Teachers In Medical Vocational Colleges.

Dimension	Definition	Representative Indicators
Knowledge (K)	Mastery of disciplinary content and educational theory	Medical subject knowledge; instructional design; interdisciplinary integration
Skills (S)	Practical, instructional, and digital abilities	Clinical teaching skills; digital simulation; research methods; curriculum development

Dimension	Definition	Representative Indicators
Professional Ethics (E)	Adherence to medical and educational ethical standards	Compliance with clinical ethics; integrity in teaching; respect for institutional values
Personal Traits (P)	Interpersonal and intrapersonal characteristics that support effective teaching	Communication; empathy; adaptability; teamwork
Motivation (M)	Internal and external drives that sustain professional engagement	Mission orientation; student-centered goals; desire for recognition; commitment to growth

Source: (Developed By The Author Based On The Onion Model (Spencer & Spencer, 1993) And Synthesis Of Relevant Studies On Teacher Competencies In Medical Vocational Education)

Compared to earlier models, the KSEPM framework places emphasis not only on observable teaching behaviors but also on the internal values and educational beliefs of teachers. It further accounts for the specific attributes required of instructors in medical vocational colleges, such as medical ethics and professional integrity, recognizing these as essential internal drivers of effective teaching.

Identified Research Gaps

Despite the growing interest in dual-qualified teacher competencies in Chinese vocational education, the existing literature reveals several critical gaps. While the role of dual-qualified teachers—those possessing both academic and practical industry expertise—has been increasingly emphasized in policy and institutional reform, the research landscape remains conceptually fragmented. Many studies present scattered themes, vague definitions of core concepts, and inconsistent interpretations of what constitutes dual-qualified competency. Qualification standards lack consensus, and training systems and models often remain overly uniform, failing to reflect the diverse demands of different vocational sectors.

First, while multiple competency models have been developed, few are specifically tailored to the demands of the medical vocational education context. Many studies rely on generic frameworks or adaptations from broader teacher education models without incorporating the sector-specific expectations of clinical integration, healthcare policy literacy, or student-practice supervision.

Second, although performance is a recurring theme in competency research, the empirical linkage between competency components and measurable outcomes—such as student satisfaction, teaching evaluation scores, or industry collaboration success—is seldom established. Theoretical assumptions abound, yet quantitative validation remains scarce.

Third, existing studies predominantly rely on descriptive or qualitative approaches, with limited use of advanced quantitative methods—such as structural equation modeling or multilevel regression—to rigorously test the predictive validity of competency models for teacher performance. As a result, the generalizability and explanatory power of current findings remain limited.

Finally, the scope of existing bibliometric studies remains relatively narrow. As revealed through this study's CiteSpace analysis, previous reviews have primarily focused on a limited number of core journals, with datasets often containing fewer than 200 records. This narrow

focus restricts the breadth of analysis, making it difficult to capture the full spectrum of current research developments and emerging themes within the broader literature.

These identified gaps justify the need for a systematic literature review that not only maps the structural development of dual-qualified teacher competency research but also interprets it through performance-oriented theoretical lenses.

Methodology

This study adopts a bibliometric approach to systematically review and analyse the research landscape on the competencies of dual-qualified teachers in Chinese vocational colleges. It aims to trace the development trajectory of the field over the past decade by examining the pace of research growth, the distribution of key authors, patterns of collaboration, and the types and geographic locations of affiliated institutions. In addition, the study explores prevailing research themes and offers insights into potential future directions.

Research Method

This study adopts a bibliometric approach to analyze the annual distribution of publications, keyword frequencies, author productivity, and institutional affiliations. To investigate the structural patterns and thematic evolution of research on dual-qualified teacher competency, this study utilized CiteSpace (version 6.3.R1), a widely recognized bibliometric visualization software developed by Chaomei Chen. CiteSpace is particularly effective in mapping co-occurrence relationships, visualizing knowledge domains, and identifying emerging trends in scholarly research.

As shown in Figure 1, the research process consists of four main steps. It begins with literature selection from the CNKI database (2015–2025), followed by data cleaning and formatting to ensure consistency. Next, bibliometric visualizations are generated using CiteSpace to produce knowledge maps and identify clustering patterns. The final step involves interpreting the results to extract meaningful insights and inform future research directions. This process provides a comprehensive foundation for reflecting on existing scholarship and identifying future research directions in dual-qualified teacher development.

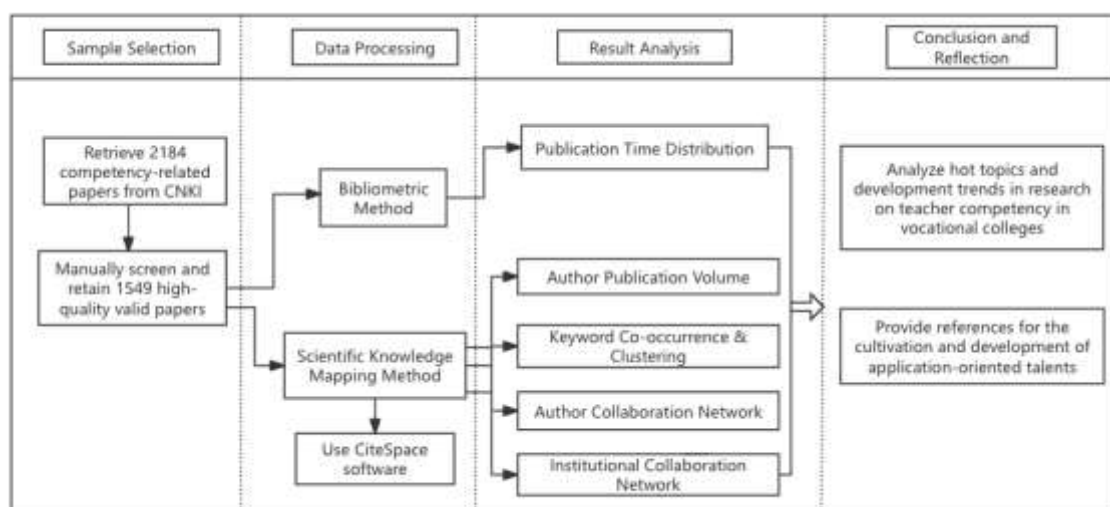


Figure 1: Research Design Framework

Source: M. Zhang and Zhang (2022).

Data Collection and Processing

To ensure comprehensive coverage of relevant research, a systematic search was conducted on the China National Knowledge Infrastructure (CNKI) database. The keyword combination used was dual-qualified teachers and higher vocational colleges, with a publication date range from January 2015 to May 2025.

An initial search retrieved 2,184 records. Given that this study utilizes CiteSpace to conduct co-occurrence and clustering analyses of keywords, non-academic documents such as reviews, book notices, and reports—most of which lacked valid keywords—were excluded. A total of 1,549 valid records were retained and imported into CiteSpace in RefWorks format. Although the selected literature was not limited to the medical or healthcare field, the analytical perspective of this review is deliberately framed around CMVCs. This interpretive focus reflects both the institutional relevance of the findings and the growing demand for competency-based teacher development in CMVCs. The broader corpus—drawn from diverse vocational sectors such as engineering, nursing, IT, and finance—provides a valuable foundation for constructing models applicable to the healthcare context.

Despite the fact that four previous studies have applied visual bibliometric techniques, their analyses were limited to much smaller corpora—typically only 100 to 150 articles—and relied mainly on the core-journal subset of CNKI. In contrast, this study draws on a broader dataset, enhancing the robustness of the bibliometric analysis and enabling a more comprehensive understanding of research patterns, thematic clusters, and institutional networks.

Data Analysis Using CiteSpace

The dataset of 1,549 filtered publications was exported from CNKI and processed in CiteSpace. Parameters were set as follows: time slicing from 2015 to 2025 with one-year intervals; node types including keywords, authors, and institutions; top 50 nodes selected per slice based on frequency; and pruning through Pathfinder to simplify visual complexity. These methodological choices align with common practices in bibliometric analysis (Zupic & Čater, 2015).

Rather than merely generating descriptive statistics, CiteSpace provides a structural and temporal analysis of the field, enabling this study to map influential research themes, identify central contributors, and visualize collaboration networks. These outputs were used not as end results, but as analytical scaffolds to guide the thematic synthesis in the literature review.

By integrating CiteSpace, the study adopts a transparent, replicable, and theory-informed approach to knowledge mapping—one that supports both macro-level trend identification and micro-level conceptual analysis.

Result and Discussion

Overview of the Bibliometric Landscape

To capture the developmental trajectory of research on dual-qualified teachers in Chinese medical vocational colleges (CMVCs), a bibliometric overview was conducted based on publication data from 1999 to 2025. As illustrated in Figure 2, research interest in this field has evolved through three distinct phases.

In the early stage (1999–2005), publication volumes remained minimal, with fewer than 10 outputs annually. This suggests that the concept of dual-qualified teachers was still nascent, and formalized discussions within academic literature were limited. Since 2005, research on dual-qualified teachers in Chinese medical vocational colleges has shown a significant upward trajectory, with publications rising from 31 in 2005 to a peak of 179 in 2012. The period between 2013 and 2018 reflects a plateau, with annual output stabilizing around 130–140 papers.

A second surge emerged between 2019 and 2021, culminating in a historical high of 197 papers in 2020, driven in part by national policy reforms such as the “Double High Plan” (MoE, 2019). Since 2020, research on dual-qualified teachers in medical vocational education has maintained a relatively high volume, with annual publications consistently exceeding 160. This trend reflects not only continued academic interest but also the deeper integration of dual-qualified teacher development into national vocational education policies, particularly those focused on improving teaching quality and aligning education with industry needs (Xie, Feng, & Cen, 2025; M. N. Zhang et al., 2024).

This macro-level bibliometric overview lays a foundational basis for the subsequent in-depth analyses of keywords, authorship patterns, and institutional collaboration. The decision to focus on the 2015–2025 period is grounded in three key considerations. First, this decade represents the most productive phase in terms of publication volume, with annual outputs consistently exceeding earlier years. Second, it coincides with a series of pivotal national policies, which collectively elevated the strategic importance of dual-qualified teachers in vocational education. Third, literature from this period demonstrates greater theoretical maturity and increasing methodological rigor, offering a richer and more coherent foundation for systematic review and thematic synthesis.

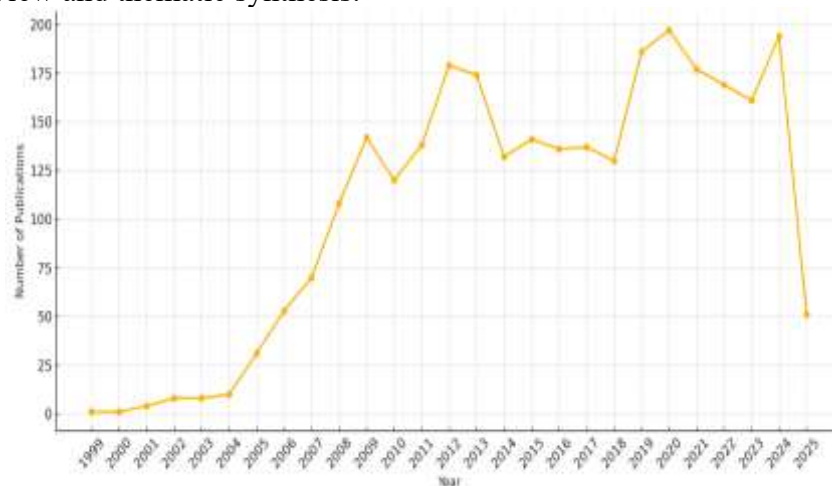


Figure 2: Annual Number of Publications on Dual-Qualified Teachers (1999–2025)

Source: CNKI database, compiled and visualized by author.

Keyword Co-occurrence Analysis

To investigate the conceptual structure of research on dual-qualified teachers in Chinese medical vocational colleges, this study conducted a keyword co-occurrence analysis using CiteSpace, based on 1,549 publications from 2015 to 2025. The resulting knowledge network

(Figure 3) reveals 15 clusters generated through Latent Semantic Indexing (LSI), each representing a coherent thematic focus within the literature.

At the core of the network are the nodes “higher vocational colleges” and “dual-qualified teachers,” underscoring their foundational and central roles in this research domain. Surrounding these core elements are clusters such as “school-enterprise cooperation,” “vocational education,” and “faculty development,” highlighting strong thematic orientations toward institutional collaboration and capacity building. This structural map not only reflects concentrated research interests but also provides a basis for subsequent analysis of thematic evolution and knowledge integration.

Temporal color-coding shows that nodes such as Double High Plan, Recognition Standards, and Industry-Education Integration have gained prominence in recent years (2021–2025), reflecting emerging interests in policy-driven teacher qualification mechanisms and practical integration with industry. Meanwhile, nodes like Curriculum System and Teaching Reform—mostly in blue and green—suggest long-standing themes that are now relatively stable.

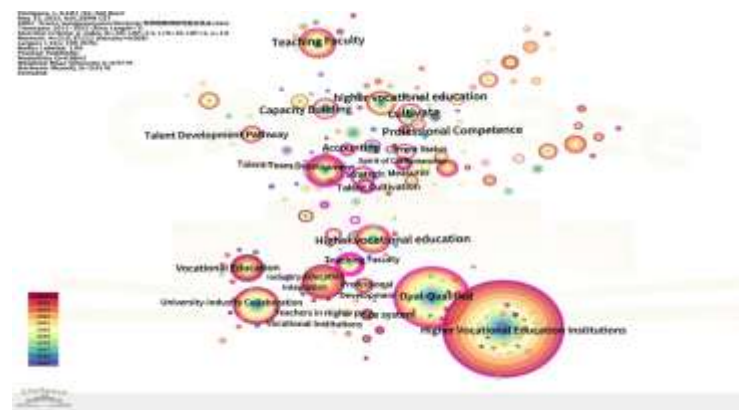


Figure 3: Keyword Co-Occurrence Network of Research on Dual-Qualified Teachers (2015–2025)

Source: CNKI database; visualized using CiteSpace 6.3.R1.

A summary of the fifteen clusters is provided in Table 2. For example, Cluster #0 relates to institutional reform in vocational education, Cluster #1 focuses on certification and recognition standards, while Cluster #7 highlights enterprise-based teacher training. Clusters covering professional development, team building, and evaluation systems indicate a growing emphasis on competency frameworks and performance-linked mechanisms.

Table 2: Cluster-Level Keyword Themes.

Cluster	Theme Label	Representative Keywords
# 0	Vocational Education	curriculum system, teaching reform, talent cultivation model
# 1	Recognition Standards	qualification standards, certification, teacher recognition
# 2	Practical Teaching	skill development, professional courses, practice base
# 3	Teaching Team Development	team teaching, teacher collaboration, shared preparation

# 4	Professional Development	teacher training, workshops, lifelong learning
# 5	Policy Guidance	policy, guidelines, regulation, Double High Plan
# 6	Educational Reform	modular curriculum, competency-based education
# 7	Enterprise Practice	enterprise training, industry internships, joint projects
# 8	Evaluation Systems	teacher evaluation, performance appraisal, assessment metrics
# 9	Double High Plan	national policy, funding, institutional upgrading
# 10	Curriculum Integration	integrated curriculum, interdisciplinary teaching
# 11	Teaching Ability	lesson planning, classroom management, pedagogy
# 12	Mentorship and Coaching	mentorship, supervision, student development
# 13	Ideological Education	ideological education, moral instruction, political integration
# 14	Cross-sector Collaboration	school-industry collaboration, innovation alliance

Source: CNKI database; visualized using CiteSpace 6.3.R1.

Taken together, the keyword co-occurrence network reflects a research field that is structurally cohesive and gradually expanding in thematic scope. The focus has shifted from initial discussions on the basic qualifications of dual-qualified teachers to more integrated issues such as school-enterprise collaboration, competency assessment, and policy coordination. This evolution indicates a maturing research paradigm that increasingly emphasizes practical application and institutional development.

Timeline Analysis of Keyword Clusters

To examine the temporal dynamics of research on dual-qualified teachers, a timeline visualization was generated using CiteSpace (Figure 4). This map illustrates the evolution of keyword clusters from 2015 to 2025. Each horizontal line represents a thematic cluster, labeled from #0 to #10, while circular nodes indicate the frequency and temporal distribution of keywords within each cluster. The gradient color—from purple (2015) to red (2025)—visually reflects the shifting focus of research across different time periods.

Notably, Cluster #0 (“Higher Vocational Colleges”) and Cluster #1 (“Dual-Qualified”) emerged early and remained active throughout the decade. Their long temporal span and consistent presence suggest their foundational position in the field. In contrast, Cluster #9 (“Double High Plan”) and Cluster #10 (“Professional Development”) are distinctly more recent, with strong activation between 2020 and 2024. This reflects the growing impact of national-level initiatives like the Double High Plan on both research direction and institutional practice. The timeline visualization clearly illustrates the differences in research continuity and intensity across various thematic clusters. For instance, Cluster #2 (“Current Situation”) is primarily concentrated between 2016 and 2018, reflecting early efforts to clarify core concepts and assess the institutional landscape of dual-qualified teacher policies. In contrast, Clusters #5 (“Higher Vocational Education”) and #6 (“Teacher Workforce”) exhibit recurrent activity over multiple years, suggesting that while scholarly focus may fluctuate, these themes remain persistently

relevant. Such fluctuations likely correspond to periodic shifts in national vocational education reform policies.

A particularly dynamic evolution is observed in Cluster #3 (“Recognition Standards”) and Cluster #8 (“Training”), where bursts of activity occur post-2019, aligning with efforts to develop certification systems and refine teacher training pathways. These clusters reflect the field’s growing movement toward measurable competency frameworks and structured faculty development systems.

Overall, the timeline visualization shows a clear shift in the research focus—from early descriptive studies to more structured and policy-oriented topics. It reflects how studies on dual-qualified teachers have gradually moved from general discussions about the role of vocational colleges to deeper exploration of teacher qualification standards, training systems, and development strategies. This progression closely follows the pace of China’s efforts to modernize vocational education.

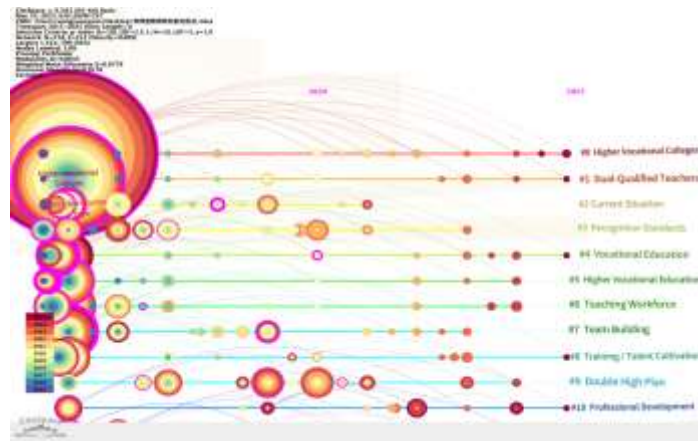


Figure 4: Timeline View of Cluster Evolution in Research on Dual-Qualified Teachers (2015–2025)

Source: CNKI database; visualized using CiteSpace 6.3.R1.

Author Co-occurrence Analysis

As shown in Figure 5, the author co-occurrence network includes 185 nodes and 55 edges, representing individual scholars and their collaborative relationships. Each node corresponds to a researcher, with node size reflecting publication frequency, and node color indicating the year of first appearance (from 2015 to 2025).

The structure of the network reveals a low-density configuration (density = 0.0032), suggesting that collaboration among researchers in this field remains limited. The modularity index ($Q = 0.9691$) further confirms that the network is highly modular, with small and relatively independent clusters rather than a tightly integrated scholarly community.

While the overall structure is fragmented, several authors stand out for their visibility and centrality. Scholars such as Zhang Jingyuan, Zhou Ting, and Gu Cuifeng are positioned near the core, indicating active participation and multi-directional cooperation. Others, including Zheng Si, Li Dongxue, and Zhao Xiaoli, are also closely connected to multiple clusters, suggesting their bridging roles within sub-networks.

The color distribution shows that early contributors such as Lu Yulan and Li Yanling were active around 2015–2018, focusing on initial competency frameworks and teacher qualification standards. In contrast, newer participants like Zhou Lei and Yang Xiaomei have emerged in recent years (2022–2025), bringing fresh perspectives to ethics, ideological education, and structured training.

Despite these developments, the limited interconnection among key scholars highlights the need for greater cross-institutional collaboration and national research coordination to strengthen theoretical foundations and foster sustained academic dialogue.

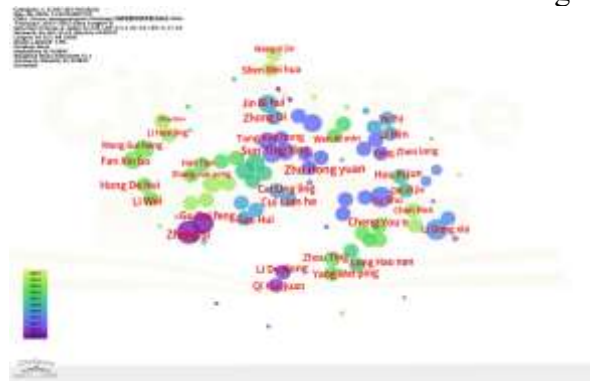


Figure 5: Author Co-occurrence Network of Research on Dual-Qualified Teachers (2015–2025)

Source: CNKI database; visualized using CiteSpace 6.3.R1.

Institution Co-occurrence Analysis

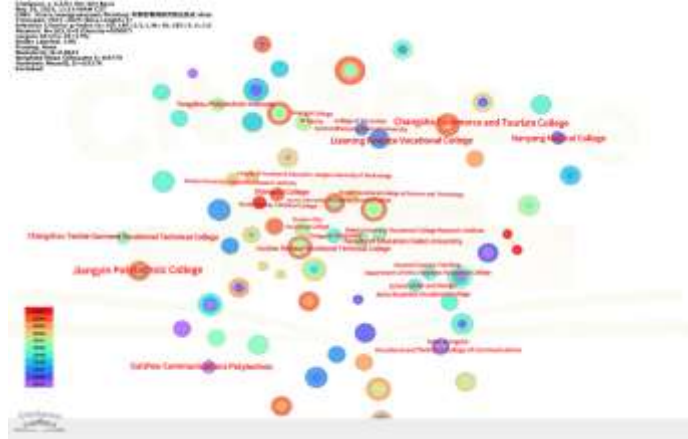
Figure 6 shows the institutional co-occurrence network based on 163 nodes and 9 connections, generated using CiteSpace (v6.3.R1) for the period 2015 to 2025. Each node represents a research institution, where the size of the node reflects the number of publications, and the color indicates the first year of appearance. The low network density (0.0007) and high modularity score ($Q = 0.8643$) suggest that research on dual-qualified teachers is scattered across institutions, with limited cooperation between them.

The network reveals that most institutions have conducted research independently. There are few collaborative ties, and only a small number of nodes are connected. This pattern shows that although more institutions have joined the discussion in recent years, systematic cooperation is still lacking.

Several institutions have played a more active role. Jiangyin Polytechnic College, Changsha Commerce and Tourism College, and Liuzhou Railway Vocational College have published regularly over multiple years and occupy central positions in the network. These colleges may serve as important local centers for exploring teacher competency and related policy practices. Other institutions—such as Hunan Information Vocational and Technical College, Jiangsu Food and Pharmaceutical Science College, and Nantong Vocational University—also show higher activity in recent years, marked by warmer node colors. Their involvement may be linked to national policy actions like the “Double High Plan” and increased attention to teacher training in medical and pharmaceutical fields.

However, the overall lack of close collaboration remains a key issue. Many institutions appear as isolated points, with no shared research or joint publications. For example, Inner Mongolia

In summary, while institutional interest in dual-qualified teacher research is growing, academic exchange and coordinated development are still limited. Strengthening collaboration between institutions—through shared platforms, joint projects, or policy support—may help promote deeper and more sustainable progress in this field.



Source: CNKI; visualized using CiteSpace 6.3.R1.

While earlier sections have outlined the structural landscape of dual-qualified teacher research, the thematic integration between competency development and performance outcomes remains a central concern. The co-occurrence patterns and keyword clusters suggest that although both terms frequently appear, they are often treated as parallel but disconnected constructs.

The timeline visualization (Figure 4) indicates that discussions on teacher performance began to gain attention only after earlier work had focused on defining competency, particularly from 2019 onward. This pattern suggests that performance-related research has largely followed policy reforms, rather than guiding them. In addition, keywords such as “assessment,” “performance evaluation,” and “training quality” have appeared more frequently in recent years, reflecting a rising—but still fragmented—interest in how teacher competency connects to actual outcomes.

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These gaps indicate a clear need for integrative research models that can account for how specific competencies—such as enterprise engagement, teaching innovation, and ethical conduct—affect institutional goals, student employability, and service quality in medical vocational education.

In short, although the research field has matured in defining competencies and performance expectations independently, it still lacks robust conceptual bridges and methodological tools for connecting the two domains. This highlights an important agenda for future research: building multi-dimensional evaluation frameworks that align teacher development with institutional performance mandates.

Conclusion

This study systematically reviews the development of research on dual-qualified teachers in China's higher vocational colleges, with a particular focus on the evolution of competency concepts and their connection to teacher performance. By integrating bibliometric analysis, keyword co-occurrence mapping, thematic clustering, and timeline visualization, it provides a comprehensive overview of research patterns and trends in this field from 2015 to 2025.

The findings indicate that in recent years, research on the competency of dual-qualified teachers in higher vocational institutions has become increasingly enriched, with expanding theoretical scope. However, the overall research structure and methodological approaches remain fragmented, particularly in the context of medical vocational colleges. To address this gap, the present study systematically reviewed relevant literature published between 2015 and 2025 and proposed a competency framework composed of five key dimensions: Knowledge, Skills, Ethics, Personal Traits, and Motivation—collectively referred to as the KSEPM model. This model integrates elements from established international frameworks such as the Iceberg Model and the Onion Model, while being tailored to the institutional context and occupational demands of China's medical vocational education. It demonstrates strong local relevance and practical orientation. The proposed framework not only provides a structured foundation for examining the relationship between competency and teacher performance but also offers theoretical support for the improvement of teacher development policies and performance evaluation systems.

This study also reveals a noticeable imbalance in the distribution of research efforts across authors and institutions. While a number of scholars and vocational colleges have actively contributed to the development of the field, their work is often confined to localized or provincial contexts, lacking a coherent national framework for sustained collaboration. As a result, the generalizability and theoretical integration of current findings remain limited. Furthermore, the temporal evolution of keyword clusters indicates that discussions around teacher performance have only recently gained momentum, largely in response to policy interventions such as the "Double High Plan." This suggests that research in this area is still predominantly reactive and policy-driven, rather than rooted in long-term theoretical inquiry or systematic evaluation.

Against this backdrop, it is important to consider how emerging research trends are evolving to address these challenges. In response to identified issues—including the absence of clear qualification standards, narrow training models, and lack of integrated evaluation systems—recent scholarship has begun to explore new directions aligned with national policy reform and

practical innovation. These trends are summarized in Table 2, highlighting the ongoing transformation of dual-qualified teacher development and research.

Table 3: Emerging Research Trends on Dual-Qualified Teachers in Vocational Education.

Research Trend	Key Characteristics	Future Research Implications
1. Refining Definitions and Standards	Emphasis on aligning competency standards with sectoral needs (e.g., 1+X certifications, skill benchmarks).	Explore how evolving qualification systems reshape competency frameworks and certification policies.
2. Deepening Development and Training Models	Shift from post-service training to integrated pre-service and in-service pathways involving schools, enterprises, and government.	Investigate differentiated development pathways and their effects on job performance and teacher retention.
3. Enhancing Institutional Systems	Focus on standardizing appointment, evaluation, and incentive mechanisms for dual-qualified teachers.	Build robust institutional mechanisms to monitor, reward, and support competency-based performance development.

Source: Hai (2022)

Theoretically, this study underscores the need to move beyond static competency definitions and toward more dynamic models that explicitly consider how competencies function within performance systems. The current literature often addresses these components in isolation, which impedes the development of integrated frameworks capable of informing both academic and administrative practices. Practically, the findings point to a need for more refined, context-sensitive assessment instruments that can capture the specific demands of medical vocational education, particularly in areas such as enterprise collaboration, clinical instruction, and ethical decision-making.

Looking ahead, advancing this field requires closer integration between theoretical modelling, empirical research, and policy application. On one hand, there is a need to strengthen longitudinal research designs to systematically track the evolution of teacher competency and its long-term impact on performance. On the other hand, expanding cross-regional and inter-institutional collaboration is essential to capture the diverse characteristics of vocational institutions across different contexts. Moreover, developing a unified and practical evaluation framework is crucial for addressing current inconsistencies in concepts and methodologies related to competency and performance. Together, these efforts will help deepen theoretical understanding and enhance the explanatory power and practical relevance of future studies.

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