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Original Paper

Research on Postgraduate Students' Research Competence in Chinese Journals: An LDA Analysis of Thematic Evolution and Shifting Research Foci

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Abstract

This study examines the thematic structure and development of research on postgraduate students' research competence in Chinese journal literature. A corpus of 212 articles published between 2005 and 2025 in Chinese Core Journals and CSSCI-indexed journals and retrieved from CNKI was analyzed using Latent Dirichlet Allocation (LDA) topic modeling. Five major topics were identified: the development of doctoral students' research competence, research innovation competence and its supporting mechanisms, supervisory and instructional support, problems and approaches in research competence development, and research competence development in disciplinary and practice-based contexts. Analysis of topic probabilities showed that research on doctoral students' research competence became more prominent in the later years, while research on research innovation competence remained prominent across the three study periods. In contrast, supervisory and instructional support and general problems in research competence development became relatively less prominent, whereas research situated in disciplinary and practice-based contexts remained comparatively stable. Overall, research attention broadened beyond general approaches to developing research competence. The literature increasingly considered the conditions associated with competence development and distinguished among research populations and training contexts.

Keywords

postgraduate students, research competence, LDA topic modeling, thematic evolution, shifts in research focus

1. Introduction

A central aim of postgraduate education is to help students learn how to do research. That learning goes beyond acquiring and applying existing knowledge. Students must also learn to identify researchable problems, design studies, gather and analyze evidence, conduct research, and communicate findings. These abilities are not formed in isolation. They take shape through students' research experiences and through the conditions of their training, including coursework, supervision, research activities, and the wider academic environment. Research on graduate and doctoral education has linked research training environments and research experiences to students' research self-efficacy and research productivity (Chesnut et al., 2015; Phillips & Russell, 1994; Woo et al., 2024). Research self-efficacy has also been found to differ by year of doctoral study and to be positively associated with research interest and publication experience (Lambie & Vaccaro, 2011). As postgraduate education has expanded and diversified by degree level, discipline, and program type, understanding how students develop the capacity to conduct research remains an important concern.

Chinese scholarship on this topic has developed along several lines. Early studies asked how coursework, research training, and particular training models might support research competence (Ke, 2008; Yang & Tao, 2008; Yao & Wang, 2006). Attention then moved to the conditions under which that competence grows. Researchers considered project participation (Li et al., 2019), academic training environments (Xie et al., 2023), supervisory guidance (Li & Li, 2021), and institutional support (Ren et al., 2024). More recent work has drawn distinctions among students and training settings. It has explored interdisciplinary learning experiences (Cai et al., 2022), disciplinary differences in how publication experience relates to research competence (Cai et al., 2023), and direct-entry doctoral students in science and engineering (Yang & Zhu, 2025). International studies have similarly examined research intentions, research self-efficacy, training environments, and productivity among postgraduate and doctoral students (Chumwichan et al., 2023; Livinți et al., 2021; Woo et al., 2024). Read together, these studies treat research competence not merely as an individual attribute but as something embedded in the processes and settings of research training.

This work has yielded useful insights, yet most studies remain focused on a particular student group, one dimension of research training, or a limited set of individual factors. A different Chinese literature has used bibliometric and knowledge-mapping methods to study postgraduate education in general. It has traced research hotspots, frontier topics, and changing attention (Wang et al., 2018; Yin & Wang, 2016). Such research, however, tends to treat postgraduate education as a whole, covering training models, educational quality, admissions and employment, management, and disciplinary development. Research competence is only one strand within this larger field. Existing scholarship therefore says more about specific factors, practices, and problems than about how the study of research competence has changed over time. What remains unclear is the thematic structure that has formed in the accumulated literature, whether the prominence of particular themes has risen or fallen, and how research priorities have shifted across two decades. A longitudinal account of these changes can offer a

wider view of how research competence has been understood and investigated in Chinese postgraduate education.

Reviews that rely on keyword frequencies, co-occurrence networks, or manual classification can show which topics are discussed often and how keywords relate. They may nevertheless miss thematic patterns that are embedded in the text itself. Latent Dirichlet Allocation (LDA) provides a complementary approach: it represents documents as probabilistic mixtures of latent topics and detects recurring patterns in word distributions across a corpus (Blei et al., 2003). Topic modeling has been used in many disciplines to uncover latent thematic structures in large text collections (Abdelrazek et al., 2023). For the present study, the important point is that LDA estimates topic distributions within individual documents. Once these distributions are linked to publication years, shifts in the relative prominence of themes can be examined over time. This provides a basis for tracing both thematic change and movements in research attention.

The present study focuses on research on postgraduate students' research competence published in Chinese core journals and CSSCI-indexed journals from 2005 to 2025. It uses article abstracts as the textual corpus and applies LDA topic modeling to identify the main themes in this literature. The temporal distribution of those themes is then analyzed to examine changes in research attention over the 21-year period. The study addresses three questions:

RQ1. What major themes characterize research on postgraduate students' research competence in China from 2005 to 2025?

RQ2. How did these themes evolve over the study period?

RQ3. How did the major research foci shift over time?

2. Method

2.1 Data Source and Study Selection

A topic search was conducted in the China National Knowledge Infrastructure (CNKI) database on August 1, 2026, using the Chinese terms "研究生" (postgraduate students) and "科研能力" (research competence). The publication period was restricted to January 1, 2005, through December 31, 2025. Sources were limited to Chinese Core Journals and Chinese Social Sciences Citation Index (CSSCI) source journals. The search yielded 535 records. The study maps research published in this Chinese journal literature; the populations examined in the included articles were not necessarily confined to China.

Titles and abstracts were manually screened for relevance. Articles were included if they treated postgraduate research competence as a central research focus, a primary outcome variable, or a major training objective and examined it substantively. Articles that mentioned research competence only incidentally in discussions of training quality, broader competencies, or educational outcomes were excluded. Other exclusion criteria were a focus outside the study scope, nonresearch content, or the absence of a usable abstract. Screening and further review retained 221 candidate articles. A final

review excluded eight additional articles and removed one article without an abstract, leaving 212 articles for analysis.

The abstracts of these publications constituted the textual corpus for LDA topic modeling. Information on article titles, publication years, and keywords was also retained to support topic interpretation and longitudinal analysis.

2.2 Text Preprocessing

The 212 abstracts were cleaned by standardizing Unicode characters and whitespace and removing HTML remnants and abstract section labels while retaining the text following those labels. Formal Chinese word segmentation used jieba version 0.42.1 in precise mode (cut_all=False). A custom dictionary containing 490 entries was assembled from domain expressions, article keywords, and terms retained during the term review. It protected multiword expressions such as 科研创新能力 (research innovation competence) and 导师指导 (supervisory guidance). Preliminary diagnostic tokenization was used for term review and was not used directly as the final LDA input.

A general Chinese stop-word list was supplemented with domain-specific terms following review of the 100 most frequent terms and their document frequencies. Standalone background terms, including 研究生 (postgraduate student), 科研能力 (research competence), 研究 (research), 科研 (scientific research), and 能力 (competence), were removed. Informative compound terms, including 科研创新能力 (research innovation competence), were retained as complete tokens. Following the initial model comparison, 22 additional candidate stop words were reviewed. Twenty were removed, while 使用 (use) and 任务 (task) were retained. The resulting stop-word list contained 856 entries. The optimized tokenized corpus contained 9,048 tokens and 2,507 distinct terms.

2.3 LDA Model Construction and Selection of the Number of Topics

LDA models were fitted using Gensim 4.3.3 in Python 3.12.13. An initial comparison evaluated K = 3–15 using five random seeds (0, 21, 42, 84, and 100). After the additional stop-word review, models with K = 5–9 were compared using the same seeds. Terms occurring in fewer than two documents or in more than 95% of documents were removed from the optimized corpus (no_below=2; no_above=0.95; keep_n=None). This reduced the vocabulary from 2,507 to 1,037 terms, with no empty documents. Models used passes=20, iterations=400, chunksize=100, alpha=auto, and eta=auto. Table 1 reports the evaluation results for the optimized K = 5–9 models.

Table 1. LDA Model Evaluation Metrics by Number of Topics (K)

K	Mean topic coherence	SD of topic coherence	Perplexity	Stability	Topic distinctiveness
5	0.347	0.014	113.069	0.570	0.968
6	0.347	0.017	115.455	0.539	0.969
7	0.361	0.036	116.834	0.495	0.974

8	0.344	0.044	117.643	0.471	0.979
9	0.379	0.030	118.130	0.451	0.977

Note. K = number of topics; SD = standard deviation. Mean coherence, perplexity, and topic distinctiveness summarize five runs with different random seeds. Coherence was calculated using c_v and the top 10 words per topic. Training-corpus perplexity was calculated as 2 raised to the negative Gensim per-word log-perplexity bound. Stability is the mean topic–word cosine similarity after optimal topic matching with the Hungarian algorithm, averaged across the 10 pairs of random-seed runs. Topic distinctiveness is the mean pairwise Jaccard distance between the sets of the top 10 words within each model.

No model stood out as best on all evaluation criteria. Across the optimized models with K = 5–9, mean coherence was highest when K = 9. K = 5, by contrast, recorded the lowest mean perplexity, the greatest stability across seeds, and the smallest standard deviation for coherence. Inspection of the topics also pointed to the five-topic solution as interpretable. These findings motivated the use of K = 5, but they should not be read as proof that five topics are uniquely optimal. For the representative K = 5 model, seed 21 was used; its coherence came closest to the mean across the five seeds. Coherence for this model was 0.344, and training-corpus perplexity was 111.925.

2.4 Topic Interpretation and Longitudinal Analysis

Topic interpretation began after the five-topic model had been fixed. For each topic, we inspected its highest-probability terms and read the titles and abstracts of representative publications. The labels used below emerged from that reading rather than from an automated procedure.

Longitudinal analysis relied on the complete document–topic probability vectors produced by the selected model. We kept minimum_probability=0.0, which preserves all five topics. For every publication year, topic probabilities were averaged across the articles that appeared in that year. These yearly means serve as a measure of relative topic prominence; unlike a single-label assignment, they also retain the contribution of multiple topics to the same article. Dominant-topic counts are reported separately in Table 2, where each article is placed in its highest-probability topic.

A caveat is needed here: in several early years, the publication count was low, so annual estimates may reflect the influence of a few individual articles. We therefore divided the 21-year span into three equal intervals—2005–2011, 2012–2018, and 2019–2025—and compared topic distributions across them. Period-level results were then interpreted together with the annual patterns, allowing us to trace thematic development and shifts in research focus.

3. Results

3.1 Annual Publication Trends

Output on postgraduate research competence rose and fell markedly from 2005 to 2025 (Figure 1). The period began with just two articles in 2005. Publication counts then generally increased, reaching 14 by 2009. A brief dip followed, but output climbed again to 16 in 2012 and stayed at that level in 2013—the highest annual totals for the study period.

The upward movement did not persist after 2014. From then on, yearly counts moved within a narrower band; in most years, they fell between 7 and 14. Volatility remained after 2021, and the count returned to 14 in 2025. Taken together, the field first expanded and later settled into a pattern of moderate ups and downs.

Publication counts tell us about volume, but they do not necessarily tell us about substantive focus. Themes can change while annual output remains steady. The sections that follow turn to the thematic makeup of this literature and how it has moved over time.

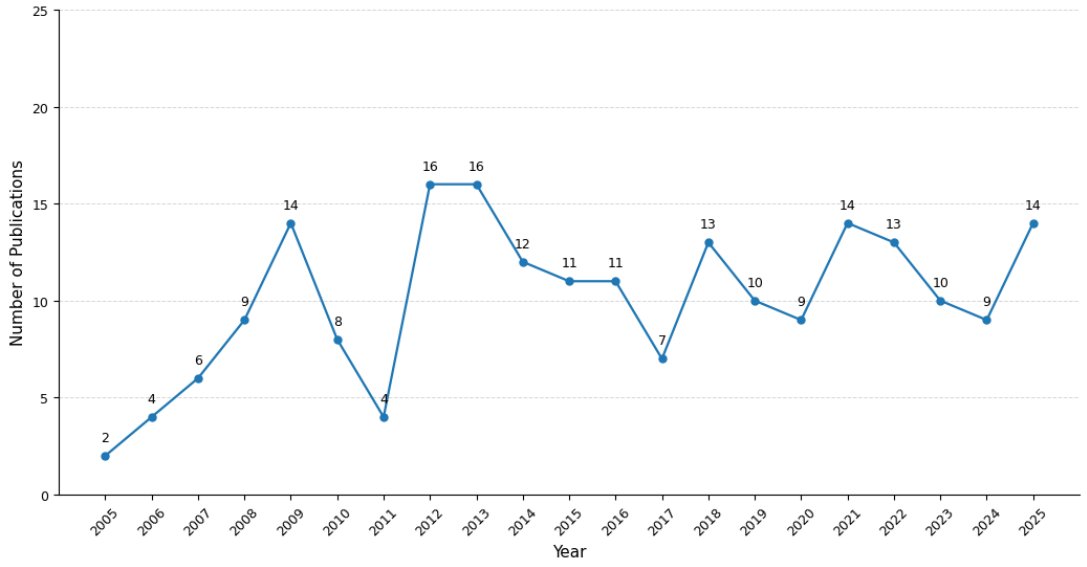


Figure 1. Annual Number of Publications on Postgraduate Research Competence, 2005–2025

3.2 LDA Topic Identification

The final LDA model identified five latent topics. Topic meanings and labels were determined by examining the high-probability terms for each topic together with representative publications and their abstracts. For ease of presentation, the five topics were labeled T1–T5 (Table 2). Although all five topics concerned postgraduate research competence, they differed in their research populations, substantive concerns, and training contexts. The topics addressed five areas. These were doctoral students' research competence, research innovation competence and its supporting mechanisms, supervisory and instructional support, problems and approaches in competence development, and competence development in disciplinary and practice-based contexts.

Table 2. LDA Topics, Topic Labels, and Top 10 Terms

Topic	Topic label	Top 10 terms	Dominant-topic publications (n)
T1	Development of Doctoral Students' Research Competence and Its Associated Factors	doctoral student; management; discipline; institutional system; use; supervisor; communication; interdisciplinary; quality; guidance	45
T2	Research Innovation Competence and Its Supporting Mechanisms	research innovation competence; university; experiment; doctoral student; master's student; support; academic; postgraduate training; field of study; nursing	89
T3	Research Competence Development through Supervisory and Instructional Support	teaching; teacher; postgraduate education; tacit knowledge; knowledge; course instruction; personal qualities; guidance; acquisition; supervisor	25
T4	Problems and Approaches in Postgraduate Research Competence Development	postgraduate education; physical education major; Master of Education; society; research innovation; innovation competence; coursework; environment; talent development; scientific research	21
T5	Research Competence Development in Disciplinary and Practice-Based Contexts	course; professional degree postgraduate student; internship; field of study; medicine; clinical; model; master's student; laboratory; center	32

Note. Terms are English translations of the original Chinese terms, listed in descending order of within-topic probability. Compound Chinese tokens are retained as single terms in translation. A publication's dominant topic is its highest-probability topic. T1–T5 = Topics 1–5.

3.2.1 Development of Doctoral Students' Research Competence and Its Associated Factors

T1 was characterized by terms related to doctoral students, disciplines, supervision, interdisciplinary activity, and research quality (Table 2). Representative publications addressed publication experience, interdisciplinary learning, research training environments, disciplinary differences, and doctoral student selection. Taken together, these studies focused primarily on the processes through which research competence develops during doctoral study and the factors associated with this development. T1 was not distinguished from T2 simply by degree level; rather, it represented a distinct line of research concerned with doctoral students' research experiences and the factors associated with their research development.

3.2.2 Research Innovation Competence and Its Supporting Mechanisms

T2 was the largest of the five topics, with 89 publications in which it had the highest topic probability. Its high-probability terms were associated with research innovation competence, universities, postgraduate training, academic support, and both master's and doctoral students (Table 2). Studies in this topic examined participation in research projects, institutional support, supervisor–student interaction, admission and selection practices, and academic preparation. T1 centered more specifically on research development during doctoral study. By contrast, T2 covered master's and doctoral students across disciplines and focused on training systems, research support, and the development of research innovation competence.

3.2.3 Research Competence Development through Supervisory and Instructional Support

T3 was characterized by terms related to teaching, teachers, postgraduate education, tacit knowledge, course instruction, guidance, and supervisors (Table 2). Studies in this topic examined instructional and supervisory guidance, interactions with supervisors and peers, course instruction, and the acquisition of tacit research knowledge. The topic therefore captured forms of support through which research competence develops during the training process, particularly through instructional interaction and academic practice.

3.2.4 Problems and Approaches in Postgraduate Research Competence Development

T4 contained terms associated with postgraduate education, coursework, educational environments, research innovation, and talent development, together with terms referring to particular fields and student groups (Table 2). Representative publications covered areas such as physical education, Master of Education programs, and library science. They commonly examined the current state of research competence development, identified existing problems, and proposed approaches for improvement, including changes in curricula, training models, and educational environments. Unlike T3, which focused on specific forms of instructional and supervisory support, T4 reflected broader concern with problems in postgraduate research competence development and approaches to improving the training system.

3.2.5 Research Competence Development in Disciplinary and Practice-Based Contexts

T5 was distinguished by terms referring to professional degree students, medicine, clinical settings, internships, laboratories, and courses (Table 2). The studies grouped in this cluster were drawn mainly from medicine, nursing, and chemistry. They examined research training in specific settings—clinical practice, laboratories, internships, and course-based instruction. T4 dealt with broader problems and approaches in postgraduate training. T5 was different: it emphasized how research competence development is embedded in particular disciplines and forms of practice. The theme thus reflected the context-specific nature of research training across disciplines and program types.

3.3 Temporal Evolution of Research Topics

Mean annual probabilities for the five topics, covering 2005–2025, are presented in Figure 2; these values were computed from the document–topic probabilities. The topics did not move in the same way.

T1 showed high values more often in the later part of the period. T2 remained comparatively high for much of the period. T3 and T4 were mainly higher early on. T5 fluctuated in a relatively stable manner.

During the early years, T1 stayed low. After 2019, high values grew more frequent, and the topic reached its highest annual probability, 0.513, in 2022. T2 had comparatively high probabilities in multiple years, among them 0.572 in 2017 and 0.530 in 2024. Rather than clustering in one phase, these higher values appeared at different points across the period.

T3 and T4 generally had higher values in the earlier years and lower values later. T3's higher values were concentrated mainly in the early part of the period; from 2018 through 2022, its annual probabilities remained below 0.10. T4 likewise had several relatively high values early on, with fewer high values toward the end. For T5, no sustained upward or downward trend was evident; between 2019 and 2025, its annual probabilities remained largely within the range of 0.13–0.20.

In some early years, the number of publications was relatively small, and individual articles could therefore have a substantial effect on annual mean topic probabilities. Isolated annual peaks should consequently be interpreted with caution. To give a more stable account of longer-term changes in thematic structure, the next section compares the five topics across three equal periods.

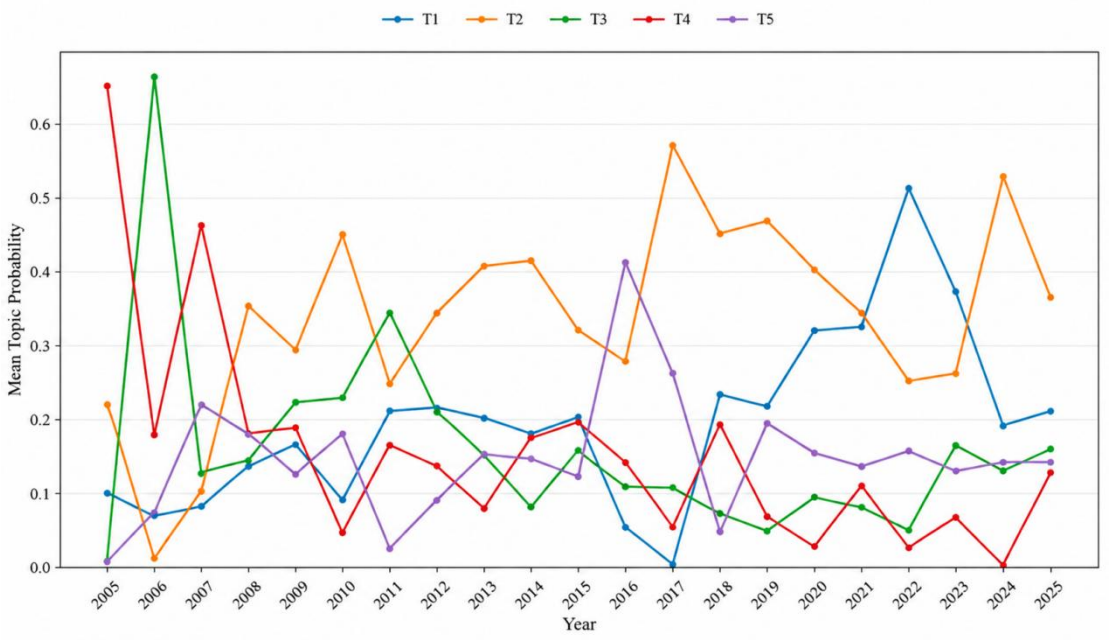


Figure 2. Mean Annual Topic Probabilities, 2005–2025

Note. T1 = development of doctoral students' research competence and its associated factors; T2 = research innovation competence and its supporting mechanisms; T3 = research competence development through supervisory and instructional support; T4 = problems and approaches in postgraduate research competence development; T5 = research competence development in disciplinary and practice-based contexts.

3.4 Changes in Topic Structure across Periods

The 2005–2025 study period was divided into three equal intervals: 2005–2011, 2012–2018, and 2019–2025, containing 47, 86, and 79 articles, respectively. For each period, topic probabilities were averaged directly across its articles (Table 3). Thus, each article received equal weight; annual means were not averaged with equal weights. The periods provide descriptive comparisons over longer time spans and were not assumed to represent distinct developmental stages.

Table 3. Mean Topic Probabilities by Period

Topic and label	2005–2011	2012–2018	2019–2025
T1 Development of Doctoral Students' Research Competence and Its Associated Factors	0.130	0.172	0.313
T2 Research Innovation Competence and Its Supporting Mechanisms	0.278	0.390	0.367
T3 Research Competence Development through Supervisory and Instructional Support	0.236	0.133	0.103
T4 Problems and Approaches in Postgraduate Research Competence Development	0.216	0.142	0.067
T5 Research Competence Development in Disciplinary and Practice-Based Contexts	0.140	0.164	0.150

Note. Values are mean document–topic probabilities for all publications in each period and indicate relative topic prominence rather than the proportion of publications assigned exclusively to each topic. T1–T5 = Topics 1–5.

The five topics were relatively close in 2005–2011. T2 led with a mean probability of 0.278, while T3 and T4 followed at 0.236 and 0.216. T1 had the lowest value, 0.130. T2's mean probability then rose to 0.390 in 2012–2018. Over the same period, T1 and T5 increased to 0.172 and 0.164, respectively, and T3 and T4 fell to 0.133 and 0.142.

In 2019–2025, T2 remained relatively prominent (0.367). T1 reached 0.313, making it the second-highest topic in the final period after being the lowest in the first. T3 and T4 continued to decline, to 0.103 and 0.067. T5's mean probability was 0.150, with little change across the three periods.

These period-level comparisons point to a clear shift in the relative prominence of the topics. T2 was consistently prominent; T1 became increasingly so. T3 and T4 declined, while T5 stayed comparatively

stable. The next section interprets these changes in topic structure alongside the annual patterns to describe broader shifts in research focus.

3.5 Shifts in Research Focus

Taken together, the annual topic probabilities and the topic distributions across the three periods indicate shifts in the focus of research on postgraduate research competence in China between 2005 and 2025. In the earlier years, relatively greater attention was given to supervisory and instructional support and to problems and approaches in research competence development. Research innovation competence and its associated factors remained a prominent focus over time, while research on the development of doctoral students' research competence became more prominent in the later years. Meanwhile, research competence development in disciplinary and practice-based contexts maintained a relatively stable presence across the three periods.

Overall, within the literature included in this study, research attention broadened beyond general problems and approaches to include greater focus on competence development and its associated factors. At the same time, research situated in specific disciplinary and practice-based contexts remained a continuing strand of the literature.

4. Discussion

4.1 From Training Approaches to Research Competence Development and Its Associated Factors

One of the clearest changes identified in this study is an extension of research attention from general approaches to developing research competence toward the development of competence itself and the factors associated with it. Earlier studies in China tended to approach research competence primarily as an educational goal. They discussed coursework, research training, and training models as possible approaches to developing postgraduate students' research competence (Ke, 2008; Yang & Tao, 2008; Yao & Wang, 2006). Within this line of research, the central question was largely how research competence could be developed through particular forms of postgraduate training.

Over time, research competence increasingly became an object of investigation in its own right. Studies began to examine how particular research experiences and training conditions were associated with differences in competence development. Research-project participation (Li et al., 2019), institutional support (Ren et al., 2024), and academic training environments (Xie et al., 2023) have been examined in relation to doctoral students' research competence. This development is consistent with the broader graduate education literature. That literature has examined research environments, research experiences, and individual characteristics in relation to research self-efficacy and productivity (Chesnut et al., 2015; Phillips & Russell, 1994; Woo et al., 2024). Research competence is thus increasingly treated not only as an intended outcome of training but also as a developmental phenomenon whose variation requires explanation.

Research questions in this literature have grown more differentiated. Some studies no longer focus solely on individual factors. They investigate whether the relationships between those factors and

research competence differ by discipline or training condition. Cai et al. (2023), for instance, documented disciplinary variation in the link between publication experience and the development of doctoral students' research competence. Such work signals a shift away from simply determining whether a factor matters. It moves toward examining when relationships occur and how they may operate.

This shift does not mean that training-oriented research has been supplanted by studies of influencing factors. Coursework, supervision, and research training continue to be important strands. The findings instead indicate that the questions themselves have widened and sharpened. Concern with how research competence can be developed remains. But researchers have also increasingly asked how it develops, what conditions accompany its development, and whether these relationships differ across disciplinary and training contexts.

4.2 Growing Attention to Doctoral Students and Differentiation of Research Populations

A second development concerns the growing attention to doctoral students in the later years of the study period. This is not to say that doctoral research competence is a recent topic. What the temporal patterns show is that doctoral students became a more visible and more differentiated group within the literature on postgraduate research competence.

Why does this differentiation matter? Master's and doctoral education differ in training objectives, in how much research students do, and in what is expected in terms of independent scholarly work. If postgraduate students are treated as one undifferentiated group, research-development issues tied to particular stages of training may be obscured. Work on the doctoral-student topic has looked at participation in research projects (Li et al., 2019), publication experience (Cai et al., 2023), interdisciplinary learning (Cai et al., 2022), and academic training environments (Xie et al., 2023). Research competence, in this line of work, is examined in relation to what doctoral students actually encounter during research training, rather than only as a general outcome of postgraduate education.

Growing differentiation is also evident in attention to variation within the doctoral population. Researchers have examined doctoral students' research competence in connection with interdisciplinary learning experiences (Cai et al., 2022), institutional support (Ren et al., 2024), and academic training environments across disciplines (Xie et al., 2023). International studies have likewise linked training environments and stages of doctoral study to several research-related outcomes, including research intentions, research self-efficacy, research interest, and research productivity (Chumwichan et al., 2023; Lambie & Vaccaro, 2011; Woo et al., 2024). These outcomes are related to research competence, but they are not the same thing. The question, then, is no longer simply whether doctoral students possess research competence. It is how that competence develops under different research and training conditions.

The increased prominence of T1 should therefore not be read as a simple shift in research interest from master's to doctoral students. Within the literature examined here, it instead indicates greater attention

to doctoral research competence as a distinct developmental issue and to differences in the experiences and environments through which doctoral students develop that competence.

4.3 Continued Attention to Research Competence Development in Disciplinary and Practice-Based Contexts

A third pattern in this evolution concerns the staying power of work anchored in particular disciplines and practice settings. General discussions of training problems and developmental approaches lost some visibility, but T5 did not. It appeared with similar strength in all three periods. Research competence in specific disciplines, program types, and forms of practice has therefore been a continuous line of inquiry, not a preliminary interest that faded as the field matured.

Medicine, nursing, and professional postgraduate education show this most clearly. Scholars in these areas have designed and studied context-sensitive ways of building research competence. Ren et al. (2022), for instance, report a BOPPPS-based workshop intended to strengthen research innovation competence among nursing master's students. The case shows that research training may be fitted to a disciplinary and professional setting, rather than offered only as a generic element of postgraduate education.

This continuity also places the broader shift described in Section 4.1 in perspective. Greater interest in factors linked to research competence has not pushed aside work on context-specific training. The two lines have developed alongside each other. Research competence can be discussed through general developmental factors, yet it is still cultivated in curricula, laboratories, clinics, internships, and other practice settings. Because disciplines and program types make different demands on postgraduate researchers, the setting of competence development remains a lasting issue.

The implication is that research competence cannot be fully separated from the environments in which students learn and do research. Ongoing work on disciplinary and practice-based contexts thus adds to, rather than conflicts with, the growing attention to developmental factors. Seen together, these trends point to a more differentiated field: one that asks both what shapes research competence and where that development takes place.

5. Conclusion

This review applied LDA topic modeling to 212 articles published in Chinese core journals and CSSCI-indexed journals between 2005 and 2025. Five themes recurred with some consistency. Over those 21 years, however, the field's emphasis shifted. Broad discussions of training problems and developmental paths gave way to more targeted questions about how research competence develops and what influences it. Doctoral students and other particular groups drew increasing attention. Work set in disciplinary and practice-based contexts remained a steady concern.

What follows from this shift is not another inventory of general factors. Future studies need to be more precise about conditions and variation. Supervisor support, research participation, and academic environments are unlikely to operate uniformly across degree levels, disciplinary backgrounds, and

training types. Whether the same experiences or training approaches serve different postgraduate groups equally well remains an open question. Rather than proposing more general principles, researchers might ask which factors are associated with research competence, for whom, and under what circumstances. That kind of specificity would deepen our understanding of how competence develops.

Several limitations apply. The sample was restricted to CNKI-indexed Chinese core journals and CSSCI source journals; the findings therefore describe thematic patterns in this literature, not the field as a whole. Abstracts served as the corpus because they allow the core content of articles to be extracted, but they do not capture everything in the full texts. Identifying and interpreting topics also depended on human judgment, using high-probability words and representative articles, so some researcher interpretation is unavoidable. Some early years also had few publications, so annual topic intensity may have been shaped by individual studies. For this reason, the analysis emphasizes long-term patterns and avoids overinterpreting single-year fluctuations.

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References

Abdelrazek, A., Eid, Y., Gawish, E., Medhat, W., & Hassan, A. (2023). Topic modeling algorithms and applications: A survey. *Information Systems*, *112*, 102131. https://doi.org/10.1016/j.is.2022.102131

Blei, D. M., Ng, A. Y., & Jordan, M. I. (2003). Latent Dirichlet allocation. *Journal of Machine Learning Research*, *3*, 993-1022.

Cai, F., Xie, X., & Wang, X. (2022). Can interdisciplinary learning experiences improve doctoral students’ academic performance? *Exploration of Higher Education*, (6), 71-78. [in Chinese]

Cai, F., Xie, X., & Zhang, Q. (2023). Can publication experience improve doctoral students’ research competence? An empirical examination from the perspective of disciplinary differences. *Chongqing Higher Education Research*, *11*(3), 105-117. [in Chinese]

Chesnut, S. R., Siwatu, K. O., Young, H. A., & Tong, Y. (2015). Examining the relationship between the research training environment, course experiences, and graduate students’ research self-efficacy beliefs. *International Journal of Doctoral Studies*, *10*, 399-418. https://doi.org/10.28945/2310

Chumwichan, S., Wongwanich, S., & Piromsombat, C. (2023). Effect of research training environment on doctoral students' research intentions. *ABAC Journal*, *43*(4), 1-18. https://doi.org/10.59865/abacj.2023.45

Ke, C. (2008). Exploration of a training model for developing master's students' research competence. *Liaoning Education Research*, (2), 53-54. [in Chinese]

Lambie, G. W., & Vaccaro, N. (2011). Doctoral counselor education students' levels of research self-efficacy, perceptions of the research training environment, and interest in research. *Counselor Education and Supervision*, *50*(4), 243-258. https://doi.org/10.1002/j.1556-6978.2011.tb00122.x

Li, C., Chen, H., & Shen, W. (2019). The effect of research project participation on the development of doctoral students' research competence: An analysis based on a national survey of doctoral graduates. *China Higher Education Research*, (7), 92-98. [in Chinese]

Li, W., & Li, F. (2021). The relationship between supervisor guidance and the development of doctoral students' research competence from the perspective of fostering virtue through education: An empirical study. *Academic Degrees & Graduate Education*, (6), 67-74. [in Chinese]

Livinți, R., Gunnesch-Luca, G., & Iliescu, D. (2021). Research self-efficacy: A meta-analysis. *Educational Psychologist*, *56*(3), 215-242. https://doi.org/10.1080/00461520.2021.1886103

Phillips, J. C., & Russell, R. K. (1994). Research self-efficacy, the research training environment, and research productivity among graduate students in counseling psychology. *The Counseling Psychologist*, *22*(4), 628-641. https://doi.org/10.1177/0011000094224008

Ren, Q., Liu, R., & Qiao, Q. (2022). Application of a BOPPPS teaching workshop in developing research innovation competence among nursing master's students. *Chinese Nursing Research*, *36*(20), 3706-3710. https://doi.org/10.12102/j.issn.1009-6493.2022.20.027 [in Chinese]

Ren, Z., Han, S., & Zhai, R. (2024). An empirical study of the influence of institutional support on doctoral students' research competence: An analysis based on data from the 2022 Nature Global Graduate Student Survey. *Journal of Graduate Education*, (6), 1-12. [in Chinese]

Wang, Z., Lan, W., Hu, D., & Li, M. (2018). Hot topics and themes in postgraduate education research in China since the beginning of the new century: A visualization analysis of CSSCI journal literature from 2000 to 2016. *Journal of Graduate Education*, (4), 1-8. [in Chinese]

Woo, H., Kim, N., Lee, J., Chae, K., & Mathew, A. (2024). Research self-efficacy and research productivity of doctoral students in counselling programmes: Research training environment as a moderator. *British Journal of Guidance & Counselling*, *52*(6), 1071-1080. https://doi.org/10.1080/03069885.2023.2297892

Xie, X., Chen, H., & Shen, W. (2023). The impact of the academic training environment on the development of doctoral students' research competence: From the perspective of disciplinary differences. *Journal of Graduate Education*, (4), 1-11. https://doi.org/10.19834/j.cnki.yjsjy2011.2023.04.01 [in Chinese]

Yang, C., & Tao, H. (2008). Integration of coursework and research training in postgraduate education. *Academic Degrees & Graduate Education*, (3), 9-12. [in Chinese]

Yang, Y., & Zhu, Q. (2025). Factors influencing the development of research competence among direct-entry doctoral students in science and engineering: An empirical analysis based on a survey of students from 38 “Double First-Class” universities. *Journal of Graduate Education*, (3), 19-28. [in Chinese]

Yao, L., & Wang, Y. (2006). Strategies for developing postgraduate students’ research competence through course instruction. *Heilongjiang Researches on Higher Education*, (9), 89-91. [in Chinese]

Yin, Y., & Wang, H. (2016). Hot fields and frontier topics in postgraduate education research in China: A knowledge-mapping analysis of CSSCI journal articles published from 2005 to 2014. *Journal of Graduate Education*, (4), 26-32. [in Chinese]