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# A Comparative Bibliometric Analysis of Interdisciplinary Teaching Research in Chinese and International Literature

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**Abstract:** ***Interdisciplinary teaching has become an important approach for promoting curriculum integration and competency development. However, comparative studies on the research trends and knowledge structures of interdisciplinary teaching in different contexts remain limited. This study conducted a bibliometric analysis based on publications from CNKI and the Web of Science Core Collection (WoSCC). Using CiteSpace, publication trends, collaboration networks, keyword co-occurrence, clustering, and burst keywords were analyzed to identify research hotspots and emerging themes. The results show that interdisciplinary teaching research has grown steadily in both Chinese and international literature. Chinese studies mainly focus on curriculum reform, interdisciplinary thematic learning, instructional design, and artificial intelligence, while international studies emphasize STEM education, curriculum development, competency assessment, and empirical evaluation. The findings reveal different research orientations shaped by educational contexts and provide references for the future development of interdisciplinary teaching research.***

**Keywords:** Interdisciplinary teaching, Bibliometric analysis, Knowledge mapping, CiteSpace, Research hotspots.

## 1. Introduction

Against the backdrop of continuous curriculum reform, interdisciplinary teaching has emerged as a pivotal focus in basic education research and practice. For instance, the Compulsory Education Curriculum Plan (2022 Edition) issued by the Ministry of Education of China underscores strengthening curriculum integration and practical learning, promoting interdisciplinary collaboration, and organizing learning activities around authentic problems to foster students' core competencies[1]. Consequently, interdisciplinary teaching has garnered growing scholarly attention as an effective approach to breaking disciplinary boundaries and facilitating knowledge integration [2-3].

By integrating knowledge, methods, and ways of thinking from multiple disciplines through authentic contexts and comprehensive learning tasks, interdisciplinary teaching aims to cultivate students' ability to apply knowledge to solve complex problems, while simultaneously enhancing creativity, practical competence, and higher-order thinking [4]. In recent years, extensive research has been devoted to its theoretical foundations, curriculum design, instructional models, and practical applications, thereby offering valuable support for the advancement of interdisciplinary teaching.

Despite this burgeoning body of literature, extant studies have largely concentrated on theoretical discussions, case studies, or disciplinary-specific practices. Notably, systematic investigations from a comparative international perspective remain scarce. Moreover, bibliometric visualization studies are limited, making it difficult to comprehensively delineate the knowledge structure and research characteristics of this field. To address this gap, this study employs CiteSpace to conduct a bibliometric analysis of interdisciplinary teaching literature retrieved from CNKI and the Web of Science Core Collection. By visualizing publication trends, collaboration networks, research hotspots, and emerging topics, we aim to provide a comprehensive understanding of the development of interdisciplinary teaching research and to furnish references for future studies.

## 2. Research Design

This study adopted a bibliometric approach to investigate interdisciplinary teaching research in China and internationally.

### 2.1 Data Sources

To comprehensively examine the development of interdisciplinary teaching research, literature was retrieved from both the China National Knowledge Infrastructure (CNKI) and the Web of Science Core Collection (WoSCC). Given that interdisciplinary teaching is often associated with concepts such as interdisciplinary thematic teaching, STEM education, project-based learning, and phenomenon-based learning, these terms were incorporated into the search strategy to enhance the comprehensiveness of data collection. For the Chinese literature, the search terms included "interdisciplinary", "interdisciplinary thematic teaching", "STEM education", and "project-based learning". The search period spanned from January 2009 to December 2025. A total of 627 records were initially retrieved; after removing non-academic publications such as announcements and calls for papers, 618 valid articles were retained for analysis.

For the international literature, the search terms included "Interdisciplinary Teaching," "Interdisciplinary Education," "STEM Education," and "Phenomenon-based Learning." The search period also covered January 2009 to December 2025. A total of 591 records were identified; following the exclusion of conference abstracts, book reviews, and other non-research publications, 583 articles were ultimately included in the final dataset.

### 2.2 Research Methods

To conduct the bibliometric analysis, this study utilized CiteSpace 6.3.R3, a visualization tool for analyzing scientific knowledge structures and research trends [5]. Specifically, publication trends, country collaboration networks, keyword co-occurrence, keyword clustering, and burst keyword detection were systematically examined to identify research hotspots and emerging trends in interdisciplinary teaching over the past two decades [6]. These analyses provide a systematic overview of the knowledge structure and development of interdisciplinary teaching research and offer references for future educational research and practice.

## 3. Results

This section presents the results of the bibliometric analysis, covering publication trends, country collaboration, and research hotspots.

### 3.1 Publication Trends

The annual publication trends of interdisciplinary teaching research in Chinese and international literature are shown in Figure 1. Overall, research output in both contexts has increased over time, indicating growing academic interest in interdisciplinary teaching.

Chinese research shows a relatively rapid increase in publications in recent years, which is closely related to curriculum reform and the promotion of competency-oriented education. International research demonstrates a more stable growth pattern, reflecting the continuous development of interdisciplinary education in areas such as STEM education and higher education.

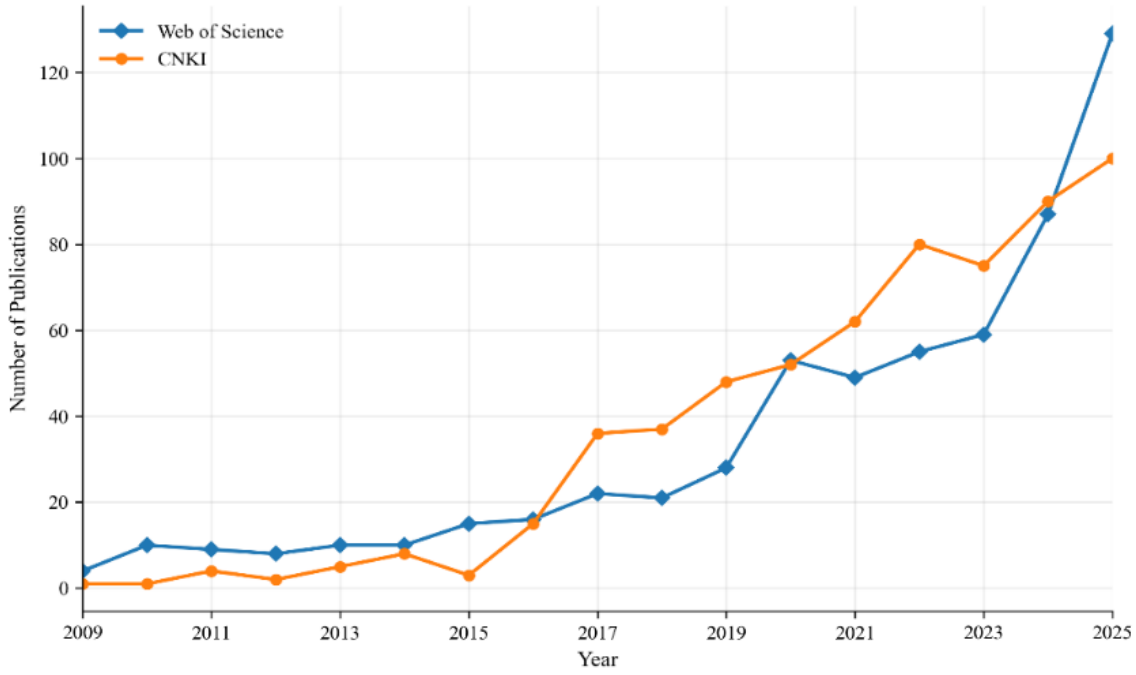


**Figure 1:** Annual Publication Trends of Interdisciplinary Teaching Research in China and Internationally

### 3.2 Country Collaboration


**Figure 2:** Country Collaboration Network in the Field of Interdisciplinary Teaching Research (International)

The country collaboration network is depicted in Figure 2. Among all contributors, the United States produced the largest number of publications and remains the most active contributor to interdisciplinary teaching research. Other major contributors include the United Kingdom, China, Australia, and Germany. In terms of betweenness centrality, the United States and the United Kingdom occupy key positions within the international collaboration network, serving as important bridges between research communities. Although China's research output has increased substantially in recent years, its relatively low centrality implies that international collaboration and global academic influence still require considerable improvement.

### 3.3 Research Hotspots

Keyword co-occurrence analysis was conducted to identify major research interests in interdisciplinary teaching research (Figures 3 and 4).

In Chinese literature, high-frequency keywords mainly include interdisciplinary teaching, core competencies, instructional design, thematic learning, maker education, and artificial intelligence. These keywords indicate that Chinese research is closely associated with curriculum reform,

focusing on curriculum integration, teaching innovation, and technology-supported interdisciplinary learning.

In international literature, major keywords include interdisciplinary education, STEM education, curriculum, higher education, critical thinking, and learning outcomes. These findings demonstrate that international research places greater emphasis on curriculum development, competency cultivation, and empirical evaluation of learning effectiveness.

Overall, both Chinese and international studies focus on curriculum integration and competency development, while Chinese research highlights practical implementation and educational innovation, whereas international research emphasizes evaluation and evidence-based practice.

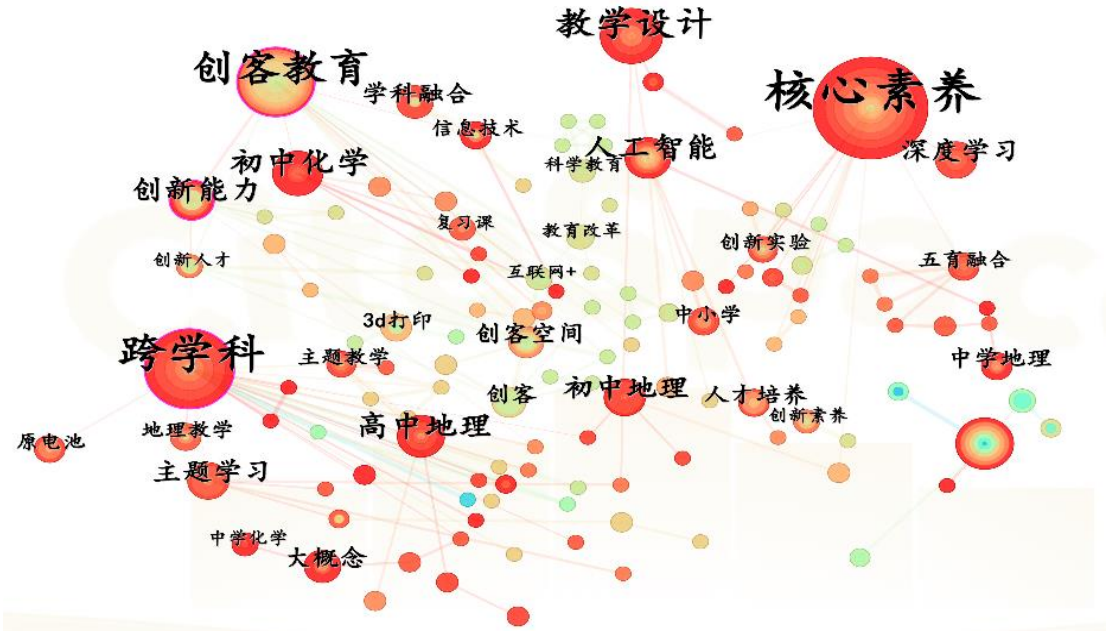


**Figure 3:** Keyword Co-occurrence Map of Chinese Interdisciplinary Teaching Research

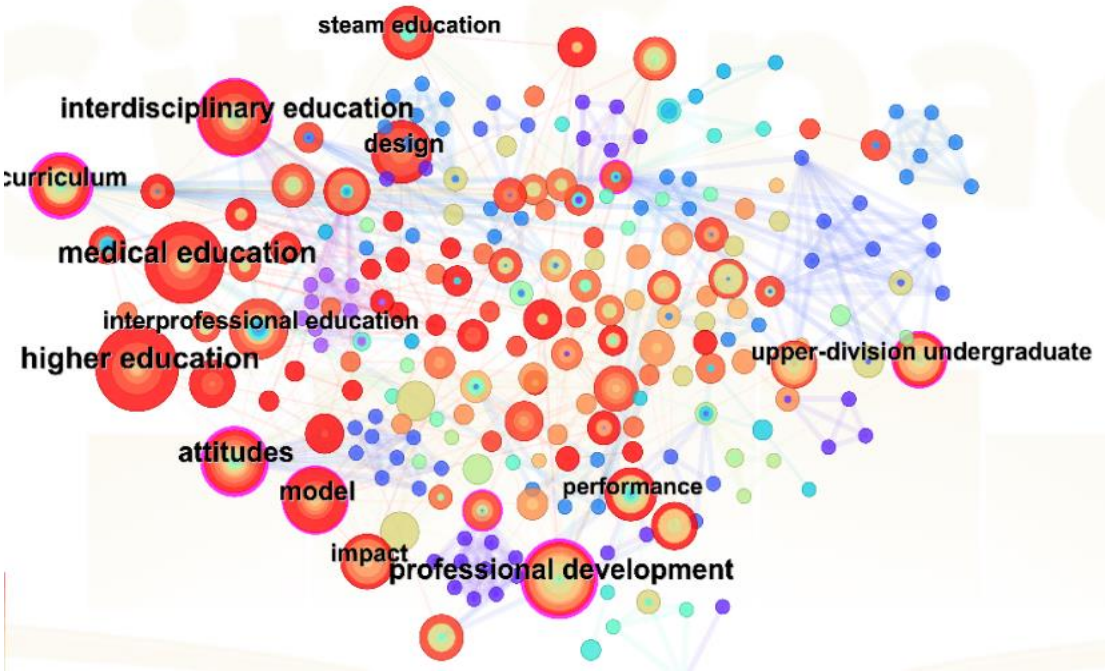


**Figure 4:** Keyword Co-occurrence Map of International Interdisciplinary Teaching Research

### 3.4 Research Themes

Keyword clustering analysis was conducted using the LLR algorithm to identify the major thematic structures of interdisciplinary teaching research. The clustering results are presented in Figures 5 and 6. The Chinese literature showed a modularity value of Q = 0.6781 and a mean silhouette value of S = 0.9464, while the international literature showed Q = 0.7526 and S = 0.8823, indicating reliable and meaningful clustering structures.

As shown in Figure 5 and Table 1, Chinese interdisciplinary teaching research mainly includes five themes: theoretical foundations and curriculum integration, competency-oriented

education, instructional practice, technology empowerment, and subject-specific applications. These themes reflect the development process from conceptual exploration to curriculum implementation and technology-supported innovation.

As shown in Figure 6 and Table 2, international interdisciplinary teaching research mainly focuses on curriculum theory and interdisciplinary education, competency development and learning outcomes, collaborative instructional models, higher education, and disciplinary applications. Compared with Chinese research, international studies demonstrate stronger attention to curriculum effectiveness, empirical evaluation, and evidence-based educational practice.

Overall, the clustering results indicate that interdisciplinary teaching research has developed around common concerns of curriculum integration and competency development, while different educational contexts have shaped distinct research orientations.


**Figure 5:** Keyword Clustering Map of Chinese Interdisciplinary Teaching Research

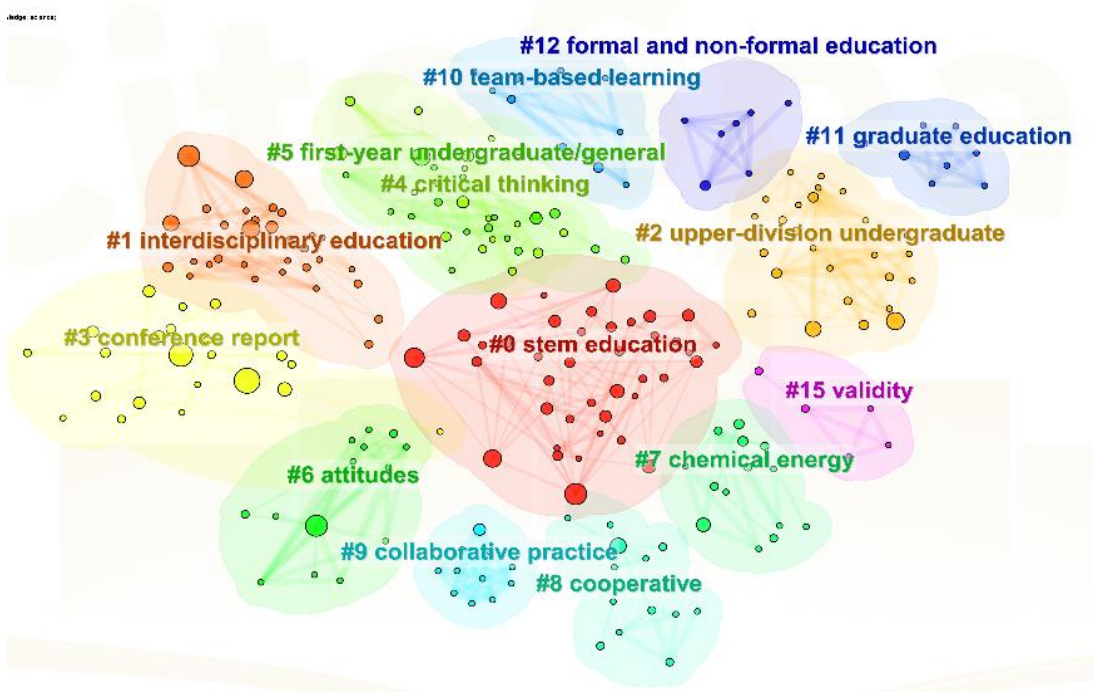


**Figure 6:** Keyword Clustering Network of International Interdisciplinary Teaching Research

**Table 1:** Research Themes and High-Frequency Keywords in Chinese Interdisciplinary Teaching Research

| Research Theme | Representative Clusters | Research Focus |
|---|---|---|
| Theoretical Foundations and Curriculum Integration | Interdisciplinary Teaching | Conceptual frameworks and curriculum integration |
| Competency-Oriented Education | Core Competencies; Holistic Education | Competency development and comprehensive abilities |
| Instructional Practice | Maker Education; Practical Teaching | STEAM, project-based learning, and teaching practice |
| Technology Empowerment | Artificial Intelligence | Digital technology and intelligent support |
| Subject-Specific Applications | Science Education; Chemistry Education | Interdisciplinary applications in specific disciplines |

**Table 2:** Research Themes and High-Frequency Keywords in International Interdisciplinary Teaching Research

| Research Theme | Representative Clusters | Research Focus |
|---|---|---|
| Curriculum Theory and Interdisciplinary Education | STEM Education; Interdisciplinary Education | Curriculum integration and interdisciplinary design |
| Competency Development and Learning Outcomes | Critical Thinking; Educational Assessment | Competency cultivation and learning evaluation |
| Collaborative Instructional Models | Cooperative Learning; Project-Based Learning | Collaborative learning approaches |
| Higher Education and Professional Development | Undergraduate Education; Graduate Education | Interdisciplinary learning in higher education |
| Disciplinary Applications | Science Education; Chemistry Education | Interdisciplinary practices in specific fields |

### 3.5 Emerging Trends

Keyword burst analysis was conducted to identify the emerging trends in interdisciplinary teaching research.

#### 3.5.1 Emerging Trends in China

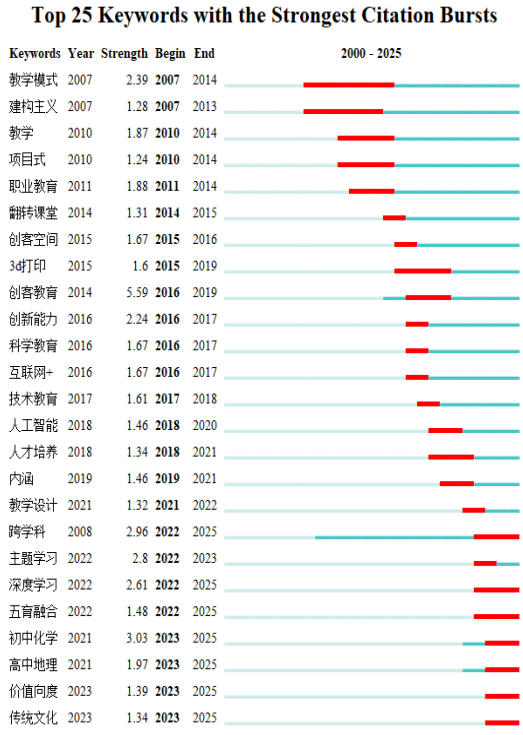


**Figure 7:** Keyword Burst Detection Map of Chinese Interdisciplinary Teaching Research

Based on the keyword burst analysis (Figure 7), the research frontiers of interdisciplinary teaching in China have evolved from exploring instructional models to emphasizing practical innovation, interdisciplinary thematic learning, and holistic education. Early studies mainly concentrated on instructional models, constructivism, project-based learning, and vocational education, highlighting the theoretical foundations and instructional design of interdisciplinary teaching. As the field progressed, keywords such as maker education, science education, artificial intelligence, and technology education emerged, signaling an increasing emphasis on technology-enhanced teaching and practical innovation. More recently, keywords including interdisciplinary teaching, thematic learning, deep learning, Five-Domain Integrated Education, and subject-specific practices such as junior high school chemistry and senior high school geography have attracted sustained attention. These trends suggest that Chinese research is increasingly oriented toward curriculum integration, competency development, and educational digitalization.

#### 3.5.2 Emerging Trends in the International Literature


**Figure 8:** Keyword Burst Detection Map of International Interdisciplinary Teaching Research

Based on the Web of Science dataset (Figure 8), international interdisciplinary teaching research has transitioned from exploring instructional models to focusing on curriculum design, competency development, and educational practice. Early studies mainly examined learner characteristics, instructional models, medical education, learning attitudes,

and active learning, with particular attention to the effectiveness of different teaching approaches. As research advanced, teacher professional development, instructional evaluation, and computational thinking emerged as important research topics, reflecting growing interest in instructional implementation and students' higher-order competencies. In recent years, keywords such as curriculum design, higher education, pedagogy, critical thinking, science education, and learning experience have become increasingly prominent, indicating a stronger emphasis on curriculum development, instructional improvement, learning outcomes, and subject-specific educational practice.

Overall, the burst keyword analysis reveals distinct developmental trajectories between Chinese and international research. Chinese studies have gradually shifted from theoretical exploration toward curriculum integration, competency-oriented education, and technology-enhanced interdisciplinary teaching. In contrast, international research places greater emphasis on curriculum development, competency cultivation, empirical evaluation, and learning experiences, reflecting a more mature and evidence-based research paradigm.

## 4. Discussion

Despite these shared characteristics, the bibliometric findings reveal distinct differences between Chinese and international research in terms of research priorities, educational contexts, and methodological approaches.

### 4.1 Comparison of Chinese and International Research

The comparative analysis reveals that interdisciplinary teaching research shares common concerns regarding curriculum integration and competency development, but different educational contexts have shaped distinct research orientations.

First, Chinese interdisciplinary teaching research demonstrates a stronger connection with curriculum reform and educational policy [1]. The emphasis on core competencies, thematic learning, and instructional design reflects the influence of curriculum reform initiatives that encourage interdisciplinary learning and comprehensive student development [7-9]. Therefore, Chinese studies tend to focus more on how interdisciplinary teaching can be implemented within existing curriculum systems and classroom practices.

In contrast, international research shows stronger connections with curriculum evaluation, learning outcomes, and evidence-based educational practice [10-11]. Influenced by interdisciplinary education traditions in areas such as STEM education and higher education, international studies often examine the effectiveness of interdisciplinary approaches through empirical investigations, assessment frameworks, and learning outcomes.

Second, differences also exist in research paradigms. Chinese studies mainly emphasize theoretical exploration, curriculum innovation, and practical application, while international studies place greater emphasis on empirical validation and evaluation mechanisms [12]. This difference indicates that interdisciplinary teaching research is influenced not only by educational objectives but also by broader academic traditions and research methodologies.

### 4.2 Implications for Future Research

The comparison suggests that future interdisciplinary teaching research could benefit from integrating the strengths of both approaches. Chinese research may further strengthen empirical evaluation and evidence-based investigation[13], while international research could pay greater attention to curriculum implementation within diverse educational contexts [14]. In addition, emerging technologies such as artificial intelligence provide new opportunities for interdisciplinary curriculum design [15-16], learning analysis, and personalized learning support.

## 5. Conclusion

This study conducted a comparative bibliometric analysis of interdisciplinary teaching research based on publications from CNKI and WoSCC. Using CiteSpace visualization, the study examined publication trends, collaboration networks, research hotspots, thematic structures, and emerging directions in Chinese and international literature.

The findings indicate that interdisciplinary teaching research has developed continuously in both contexts but presents different research orientations. Chinese research mainly emphasizes curriculum integration, instructional innovation, and technology-supported teaching, whereas international research places greater emphasis on curriculum development, competency assessment, and evidence-based evaluation. These differences reflect the influence of educational contexts and research traditions on the development of interdisciplinary teaching.

This study provides a comparative perspective on the evolution of interdisciplinary teaching research. However, the findings are limited by database selection and retrieval strategies. Future studies may incorporate broader data sources and qualitative analyses to further explore interdisciplinary teaching practices.

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