

# Mapping Entrepreneurship Education Research across CNKI and WoS: A Comparative Bibliometric Analysis and a CMO Research Agenda

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DOI: <https://doi.org/10.47772/IJRISS.2026.100800772>

Received: 29 August 2026; Accepted: 3 September 2026; Published: 17 September 2026

## ABSTRACT

Entrepreneurship education has become an established area of higher education research, but its development across publication corpora remains incompletely understood. This study compares two database-specific corpora: 3,064 English-language articles indexed in the Web of Science Core Collection and classified in the education category, and 3,649 Chinese-language journal articles from CSSCI sources in the education category and indexed in the China National Knowledge Infrastructure. CiteSpace was used to analyze publication trends, keyword co-occurrence networks, clusters, and keyword bursts. Citation evidence was analysed separately because the available CNKI export did not support the same CiteSpace co-citation procedure. WoS cited references were examined through co-citation clustering, whereas the five CNKI articles with the highest platform-specific citation counts were coded descriptively. Both corpora focused on higher education, students, and entrepreneurship education. CNKI output peaked in 2017 and then declined, whereas WoS output continued to increase through 2024. The WoS corpus gave greater prominence to self-efficacy, impact, performance, and model-based analysis. The CNKI corpus emphasized talent cultivation, entrepreneurial competence, and innovation and entrepreneurship. These patterns are consistent with a mechanism and evaluation orientation in WoS and a reform and implementation orientation in CNKI. This interpretation does not establish institutional or policy causation. The study presents a Context-Mechanism-Outcome research agenda for future empirical testing. The findings apply to the retrieved and screened corpora rather than to Chinese or worldwide entrepreneurship education research as a whole.

**Keyword:** Entrepreneurship Education; Comparative Bibliometrics; CMO Framework.

## INTRODUCTION

Entrepreneurship education has become an established area of higher education research. Studies have examined how educational provision relates to entrepreneurial knowledge, skills, self-efficacy, and intention (Thomas, 2023; Wu et al., 2022; Liñán & Fayolle, 2015; Bae et al., 2014). The field also addresses curriculum design, pedagogical practice, institutional support, and entrepreneurial development.

As the literature has expanded, two broad emphases have become visible. One concerns learner-level processes, including entrepreneurial intention, self-efficacy, competence, and skill development. The other concerns curriculum design, institutional provision, policy implementation, and entrepreneurship ecosystems. The prominence of these themes may vary across publication systems. A comparative analysis can identify areas of convergence and divergence within the literature represented by different databases.

Existing reviews have synthesized entrepreneurship education research and practice (Mohamed & Ali, 2021; Ratten & Usmanij, 2021; Fayolle & Gailly, 2015; Pittaway & Cope, 2007). Bibliometric studies have also mapped the development and thematic structure of the field (Wan & Lv, 2021; Zheng, 2018; Xia et al., 2016). However, evidence from cross-database comparisons of Chinese-language CSSCI literature and WoS-indexed

English-language literature remains limited. Such comparisons must also distinguish corpus-level patterns from contextual explanations and account for differences in database coverage and indexing.

CNKI and WoS index different and only partly overlapping bodies of literature. The WoS corpus in this study is restricted to English-language articles indexed in the WoS Core Collection. The CNKI corpus is restricted to Chinese-language journal articles from CSSCI sources. Language, database coverage, search syntax, disciplinary classification, and indexing conventions may affect the composition of each corpus. Neither corpus provides comprehensive coverage of entrepreneurship education research produced in China or internationally. The units of comparison are therefore the retrieved and screened corpora.

This study compares 3,064 WoS-indexed English-language articles and 3,649 CNKI-indexed Chinese-language CSSCI articles. The shared analyses cover publication trends, keyword co-occurrence and clustering, and keyword bursts. The analyses use aligned time windows and analytical parameters. Keywords are normalized within each corpus and aligned across languages at the concept level. Citation evidence is reported separately because the available records do not support equivalent procedures. WoS co-citation clustering identifies relationships among cited references. The CNKI analysis examines the thematic focus of the five records with the highest platform-specific citation counts. The two analyses provide different forms of citation evidence and are not used as directly comparable measures of intellectual influence.

This paper makes three contributions. First, it identifies shared and divergent thematic patterns across the CNKI and WoS corpora. Institutional and educational contexts inform the interpretation of these patterns, while bibliometric evidence is distinguished from contextual inference. Second, it documents the retrieval, screening, cross-language concept alignment, and analytical decisions used to compare the two corpora. It also reports the non-equivalent citation procedures separately. Third, it uses the identified thematic patterns to develop a Context-Mechanism-Outcome (CMO)-based research agenda. The agenda specifies propositions that require future empirical testing. The study addresses the following research questions:

RQ1: How do publication trajectories differ between the retrieved CNKI and WoS corpora?

RQ2: Which themes are shared across the CNKI and WoS corpora, and which differ in prominence?

RQ3: Which keywords show bursts in each corpus, and how do their temporal patterns differ?

RQ4: What intellectual groupings are revealed by WoS co-citation clustering, and what themes characterize the five most-cited CNKI records?

RQ5: How can the observed corpus-level differences inform a context-sensitive CMO research agenda?

## METHOD

### Data Sources, Search Strategy, and Screening

Two bounded literature corpora were constructed. The first comprised English-language articles indexed in the Web of Science Core Collection (WoS). The second comprised Chinese-language articles from CSSCI source journals indexed in the China National Knowledge Infrastructure (CNKI). The databases differ in language, journal coverage, indexing rules, disciplinary classification, and citation infrastructure. The retrieved and screened corpora constitute the units of comparison.

The WoS Core Collection was searched on 12 March 2025 using Topic = (“entrepreneurship education”) OR Topic = (“entrepreneurship”), with no restriction on publication year. The initial search returned 166,604 records. The results were restricted to English-language articles classified in the education category, leaving 3,524 records for eligibility screening. Full records and cited references were exported in plain-text format.

CNKI was searched on 17 March 2025. The exact topic search used the Chinese terms “创新创业教育” OR “创业教育”, with no restriction on publication year. The initial search returned 66,900 records. Restriction to journal articles from CSSCI sources reduced the number to 4,059. Further restriction to the education category left 3,697

records for eligibility screening. The records were exported in RefWorks format with full bibliographic information and cited references.

The search strings were not lexically identical. The WoS query combined the broad term “entrepreneurship” with restriction to the education category. This approach retained education-classified articles that did not use the exact phrase “entrepreneurship education” in their indexed topic fields. The CNKI query retained “创新创业教育” because records may be indexed under this expression in China. These choices reflect differences in database terminology and search functions. The lexical asymmetry may have affected corpus composition and is considered when interpreting the results.

The records were manually screened using their titles, abstracts, and keywords. Eligibility required entrepreneurship education, entrepreneurial learning, or entrepreneurship training to be a substantive focus. Relevant topics included learners, educators, curricula, program, pedagogy, educational policy, institutional provision, and educational outcomes. Records were excluded when entrepreneurship appeared only as background, when the primary focus was firm-level entrepreneurship or innovation without an educational component, or when the record duplicated another item. The screening process removed 460 WoS records and 48 CNKI records. The final corpora comprised 3,064 WoS articles and 3,649 CNKI articles (Figure 1). The original screening log combined topical exclusions with duplicate removal, so separate counts for each reason are unavailable.

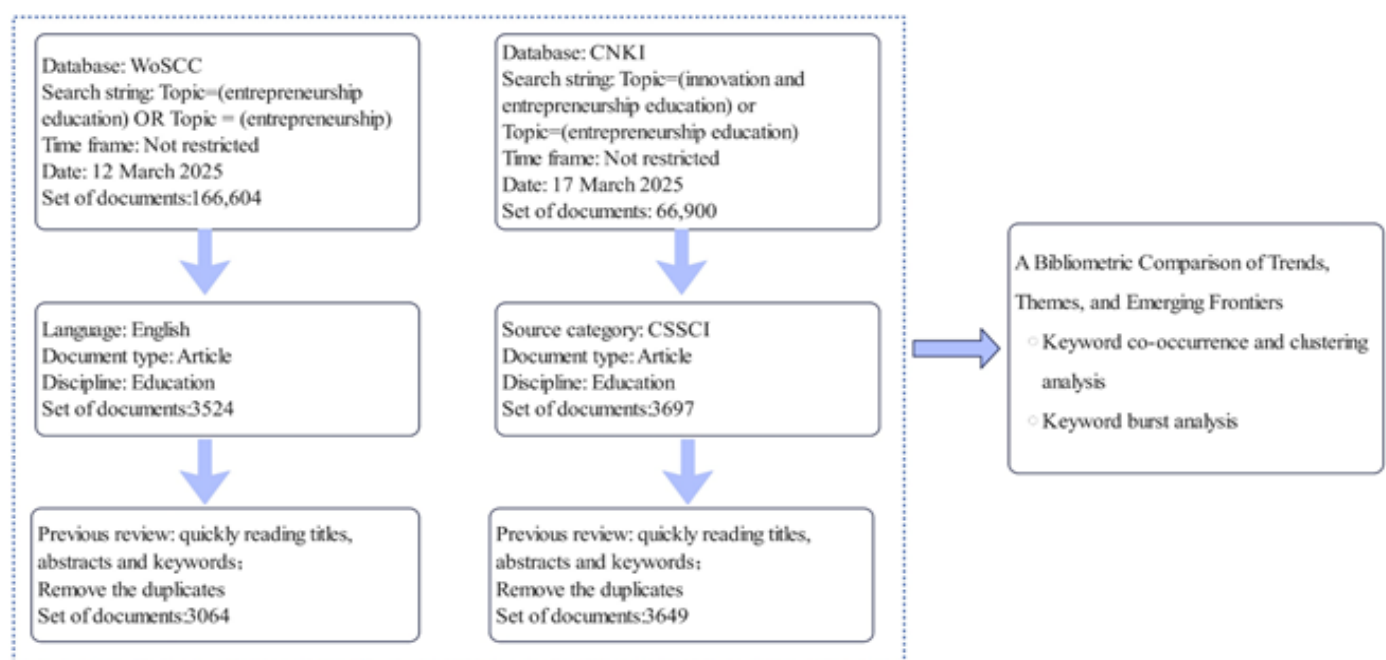


Figure 1. Database-specific retrieval, screening, and analytical procedures.

Note. Separate counts for topical exclusions and duplicate removal were not retained in the original screening log.

## Analytical Software and Parameters

CiteSpace 6.4.R1 was used to construct and visualize the bibliometric networks. Both corpora were analysed for annual publication trends, keyword co-occurrence, keyword clustering, and keyword bursts. Citation analyses were database-specific. WoS records were analysed through co-citation clustering. The five most-cited CNKI records were coded descriptively according to their thematic focus.

The analysis covered 1972-2025 and used three-year time slices. The Top N threshold was set at 50 per slice. Minimum-spanning-tree and sliced-network pruning were applied. Cluster labels were generated using the log-likelihood ratio algorithm. Modularity and silhouette values were used to assess network structure and cluster

consistency. Because the searches were completed in March 2025, annual publication trends were interpreted using complete years through 2024.

### **Keyword Cleaning and Cross-language Concept Alignment**

After record-level screening, the keywords in the retained records were cleaned and normalized before network construction. Spelling and morphological variants were merged. Abbreviations and their full forms were standardized. Close synonyms were consolidated when they referred to the same entrepreneurship education concept. Generic terms with little thematic specificity were removed.

Cross-language alignment was conducted for comparative interpretation rather than to create a merged bilingual network. Context-specific expressions were retained when no direct equivalent existed in the other language. Terms referring to higher education institutions were compared at a similar level of abstraction, as were student-related terms. The Chinese expression “创新创业教育” was retained as a distinct term and was not merged with “创业教育” (“entrepreneurship education”). These procedures reduced lexical variation but required interpretive judgement. Differences between the CNKI and WoS indexing vocabularies remained.

### **Analytical Methods and Comparability Boundaries**

The same analytical workflow was applied to annual publication trends, keyword co-occurrence, keyword clustering, and keyword burst detection. Frequencies and network structures were interpreted within each corpus. Raw frequencies were not directly compared because the corpora differ in size and indexing practices. Citation analyses followed separate database-specific procedures and provided complementary descriptive evidence.

### **Keyword Co-occurrence and Clustering Analysis**

Keyword co-occurrence analysis maps how often indexed terms appear together and identifies prominent topics and their relationships (Klarin, 2024; Su et al., 2019). Nodes represent normalized keywords, and links represent co-occurrence relationships. Node size indicates keyword frequency within the relevant corpus. Keyword frequency was interpreted as thematic prominence within that corpus.

Cluster analysis groups related nodes according to their positions and connections within a network (Lund & Ma, 2021). CiteSpace generated cluster labels using the log-likelihood ratio algorithm (Su et al., 2019). The labels were interpreted together with representative keywords and cluster-quality indicators (Chopra et al., 2021). Cross-corpus interpretation focused on cluster composition and thematic relationships. Literal equivalence between Chinese and English cluster labels was not assumed.

### **Keyword Burst Analysis**

To identify research frontiers and how they evolve over time, this study used CiteSpace keyword burst analysis. The intensity and duration of these bursts vary across different fields and topics, reflecting the evolving and dynamic nature of research content (Zhao et al., 2023; Cheng et al., 2022). In this study, frontier interpretation combined burst strength (how sharply attention rises) with the start and end years (how long the topic remains active), which supports phase-based comparison between China and international research.

### **Complementary Citation-Based Analyses**

Co-citation analysis examines the relational structure of references that are cited together (Zhao et al., 2023; X. Chen & Liu, 2020). For the WoS corpus, CiteSpace co-citation clustering was used to identify groups of references within the sampled English-language literature. Equivalent co-citation clustering was not available from the CNKI export. The CNKI analysis therefore examined the thematic focus of the five records with the highest citation counts on the CNKI platform at the date of retrieval. The WoS analysis describes relational patterns among cited references. The CNKI analysis describes the thematic content of platform-specific highly cited records. The two procedures provide different forms of evidence. Cluster size, citation counts, and intellectual influence were not compared directly.

The design supports a structured comparison of two retrieved corpora. Observed differences may reflect language, journal coverage, search syntax, disciplinary classification, keyword conventions, citation infrastructure, or substantive research priorities. The design does not isolate the effect of any single factor. Institutional and policy explanations are treated as contextual interpretations of the observed patterns.

## RESULTS AND DISCUSSION

### Publication Trends within the Two Corpora (RQ1)

Figure 2 shows different publication trajectories within the two corpora. CNKI output increased rapidly after 2007, reached its highest observed count in 2017, and then declined. WoS-indexed output continued to increase through the 2010s and reached its highest observed count in 2024. Figure 2 includes the partial publication counts for 2025 because data retrieval was completed in March 2025. These counts are reported for completeness but are excluded from the analysis of annual growth, peaks, and declines.

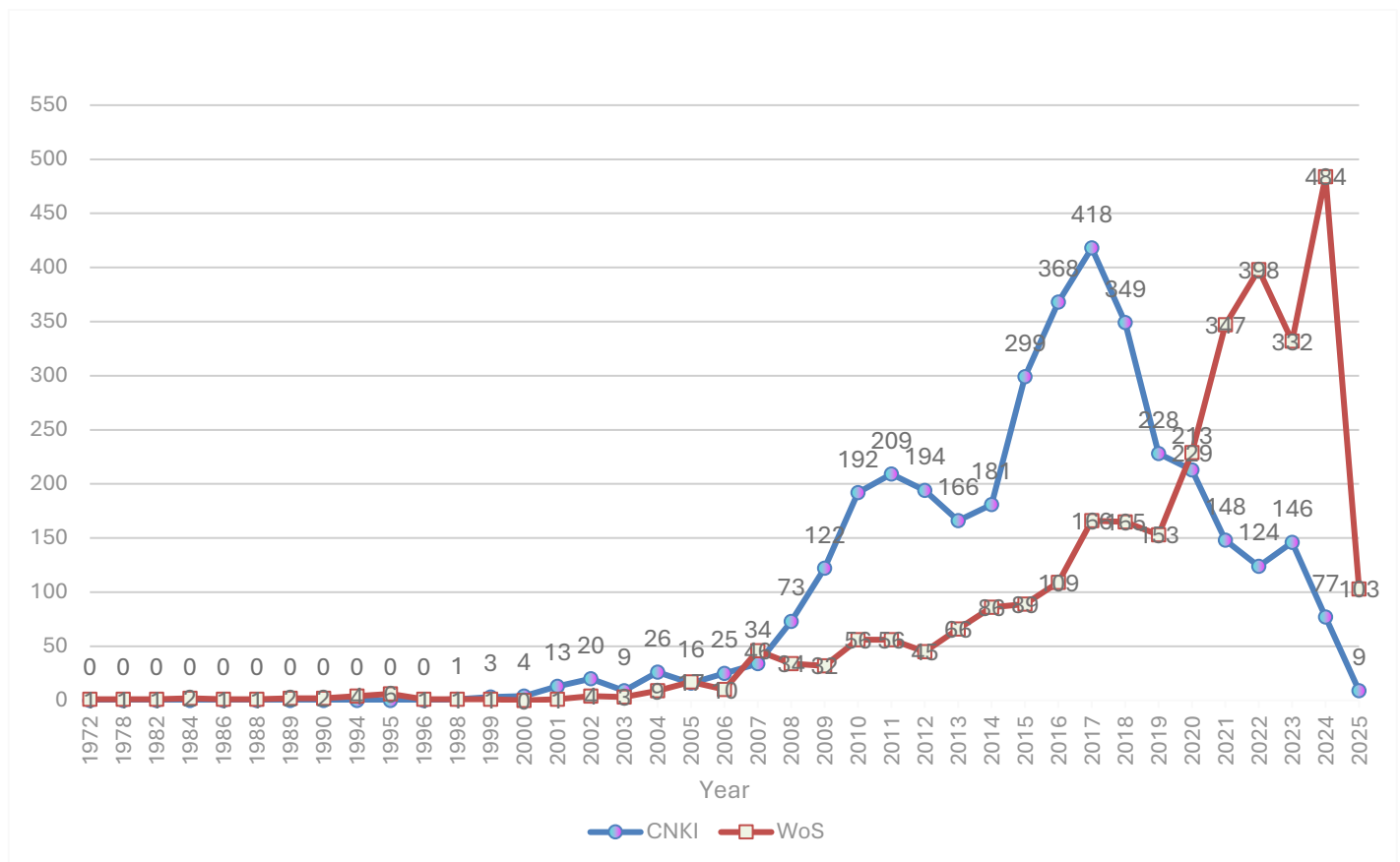


Figure 2. Annual publication output in the WoS and CNKI corpora, 1972-2025.

Note: The 2025 values represent partial-year coverage because the data were retrieved in March 2025.

The temporal patterns can support contextual hypotheses, but they do not establish their causes. The expansion of the CNKI corpus and its 2017 peak occurred near a period of strong policy attention to innovation and entrepreneurship education, including the 2015 State Council reform directive (General Office of the State Council of the People's Republic of China, 2015). This timing is consistent with, but does not prove, a policy-related publication cycle. The later decline may reflect consolidation, changes in terminology, database coverage, or shifting publication incentives. Similarly, the sustained growth of the WoS corpus may reflect wider disciplinary diffusion and increased empirical evaluation.

### Keyword Co-occurrence Patterns (RQ2)

Keyword co-occurrence mapping was used to identify major research hotspots and their connectivity (Han & Liang, 2023). CiteSpace was used to generate keyword co-occurrence networks for the WoS and CNKI corpora

(Figures 3a-3b). The analysis covered 1972-2025 using three-year time slices and selected the Top N = 50 keywords per slice. A minimum spanning tree and sliced-network pruning were applied to reduce redundant links. The merged networks were displayed using CiteSpace's default static cluster view. In the resulting networks, node size indicates keyword frequency, and link patterns reflect how topics co-occur and connect across subfields.

The maps show both convergence and divergence. In each corpus, entrepreneurship education is closely connected to higher education and student-related terms. Around this shared core, the WoS network contains more links to intention, capability, impact, and performance. The CNKI network contains more links to talent cultivation, institutional provision, and practice-oriented reform. Theme identification drew on keyword frequency, link patterns, and cluster composition. These results describe the sampled networks and should not be generalized to all English- or Chinese-language scholarship.

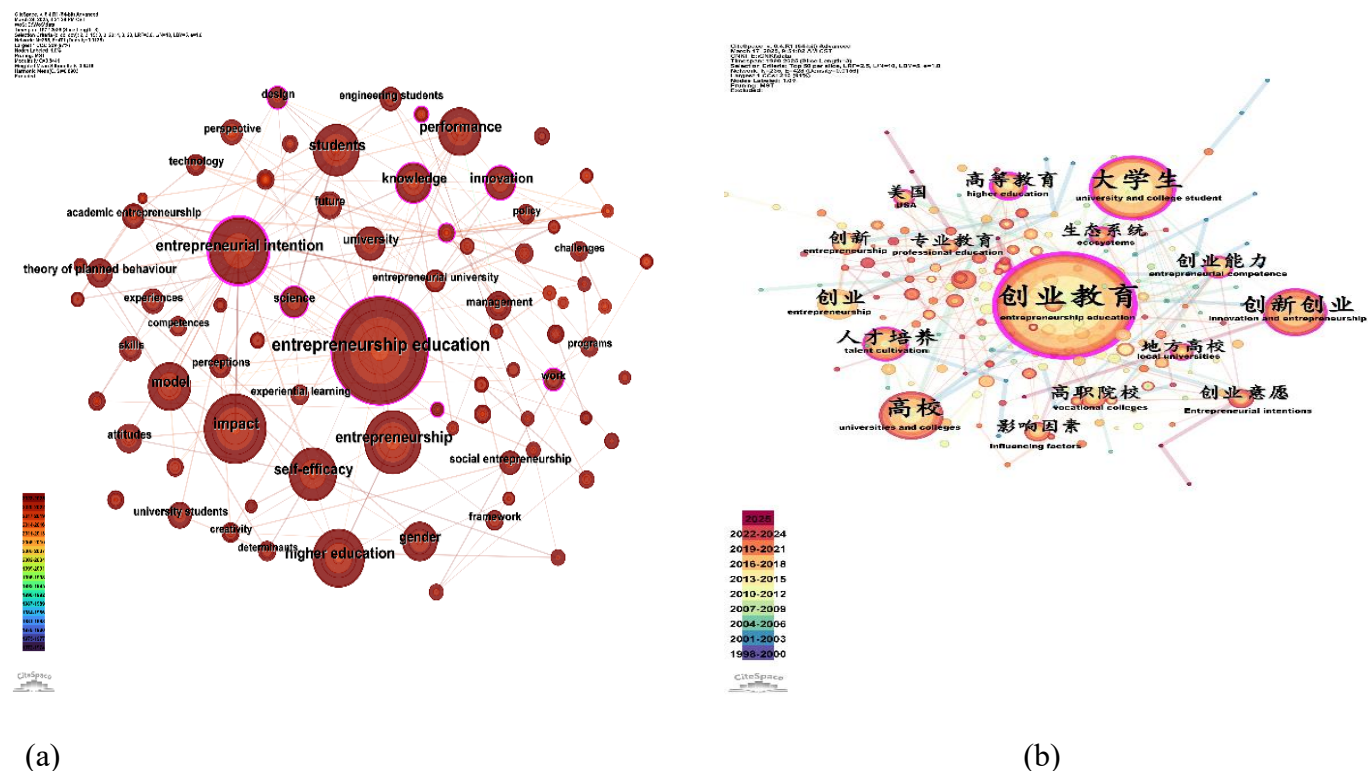


Figure 3. Keyword co-occurrence networks for (a) the WoS corpus and (b) the CNKI corpus.

Keyword clustering further summarizes the thematic structure shown in Figure 4. Both solutions met commonly used interpretive thresholds. The WoS network had a modularity value of  $Q = 0.6748$  and a weighted mean silhouette value of  $S = 0.9184$ . The CNKI network had  $Q = 0.5739$  and  $S = 0.8701$ .  $Q$  values above 0.3 indicate meaningful community structure, while silhouette values above 0.7 indicate strong within-cluster consistency (C. Chen et al., 2014; Newman, 2004). The largest WoS clusters were labelled entrepreneurial intention, entrepreneurship education, academic entrepreneurship, policy, and performance. The largest CNKI clusters were labelled university and college student, entrepreneurship education, higher education, colleges and universities, and talent cultivation (Table 1). The labels indicate different thematic profiles, but their meaning depends on database vocabulary and the LLR labelling procedure.

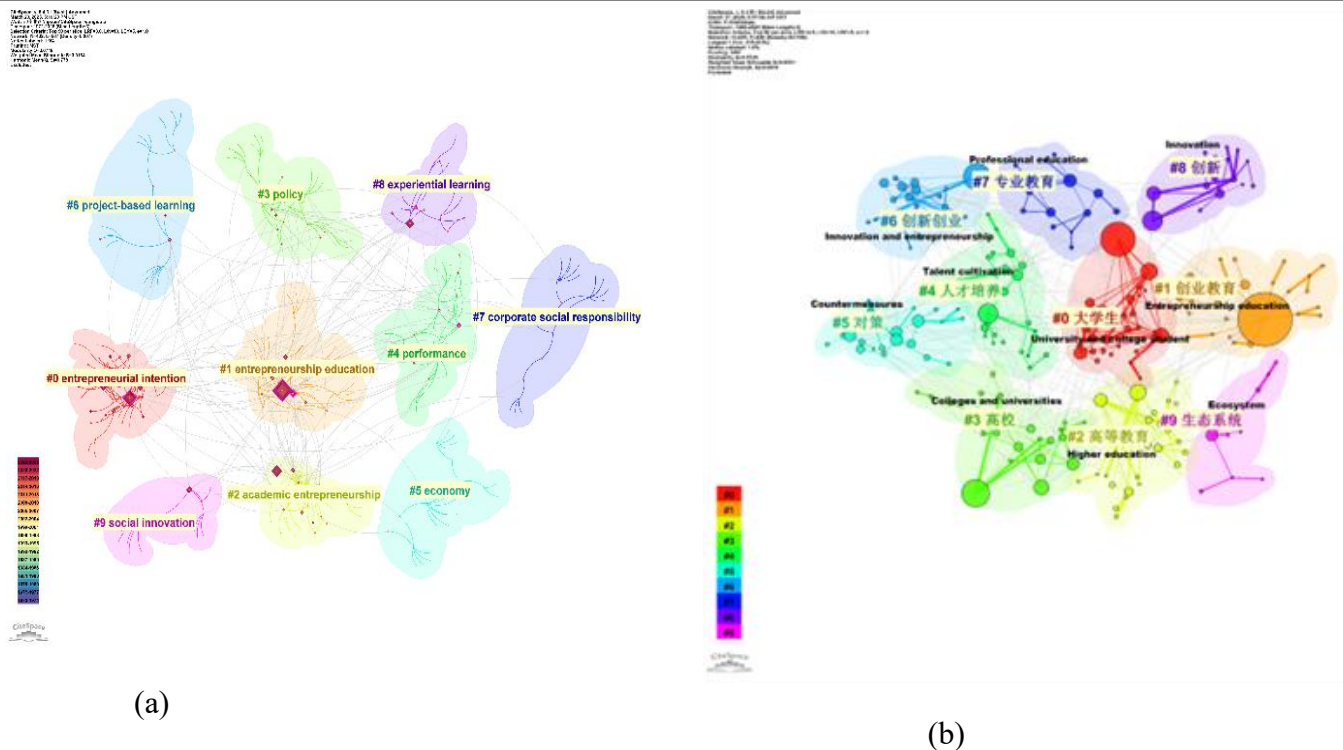


Figure 4. Keyword clusters for (a) the WoS corpus and (b) the CNKI corpus.

**Table 1. Largest Keyword Clusters in the WoS and CNKI Networks (LLR Labels)**

| ClusterID | Size | Silhouette | Mean (Year) | Label (LLR)                |
|-----------|------|------------|-------------|----------------------------|
| WoS       |      |            |             |                            |
| 0         | 34   | 0.854      | 2011        | Entrepreneurial intention  |
| 1         | 32   | 0.833      | 2006        | Entrepreneurship education |
| 2         | 30   | 0.797      | 2015        | Academic entrepreneurship  |
| 3         | 31   | 0.898      | 2008        | Policy                     |
| 4         | 29   | 0.809      | 2007        | Performance                |

Continued Table 1. Largest Keyword Clusters in the WoS and CNKI Networks (LLR Labels)

| ClusterID | Size | Silhouette | Mean (Year) | Label (LLR)                    |
|-----------|------|------------|-------------|--------------------------------|
| CNKI      |      |            |             |                                |
| 0         | 32   | 0.924      | 2011        | University and college student |
| 1         | 26   | 0.925      | 2008        | Entrepreneurship education     |
| 2         | 25   | 0.839      | 2010        | Higher education               |
| 3         | 24   | 0.817      | 2009        | Colleges and universities      |
| 4         | 24   | 0.875      | 2013        | Talent cultivation             |

### Thematic Comparison within the Sampled Corpora (RQ2)

Keyword frequency and centrality indicate a shared focus on higher education and students (Table 2). The WoS corpus includes high-frequency terms such as “higher education” and “students,” while the CNKI corpus includes “university and college student,” “universities and colleges,” and “higher education.” “Entrepreneurial intention” also appears in both corpora, indicating a shared interest in student-related outcomes.

Beyond this shared core, the thematic emphases differ. The WoS corpus gives greater prominence to “self-efficacy,” “impact,” “performance,” and “model.” The CNKI corpus gives greater prominence to “talent cultivation,” “entrepreneurial competence,” and “innovation and entrepreneurship.” The CNKI network also links entrepreneurship education to institutional provision and practice-oriented reform.

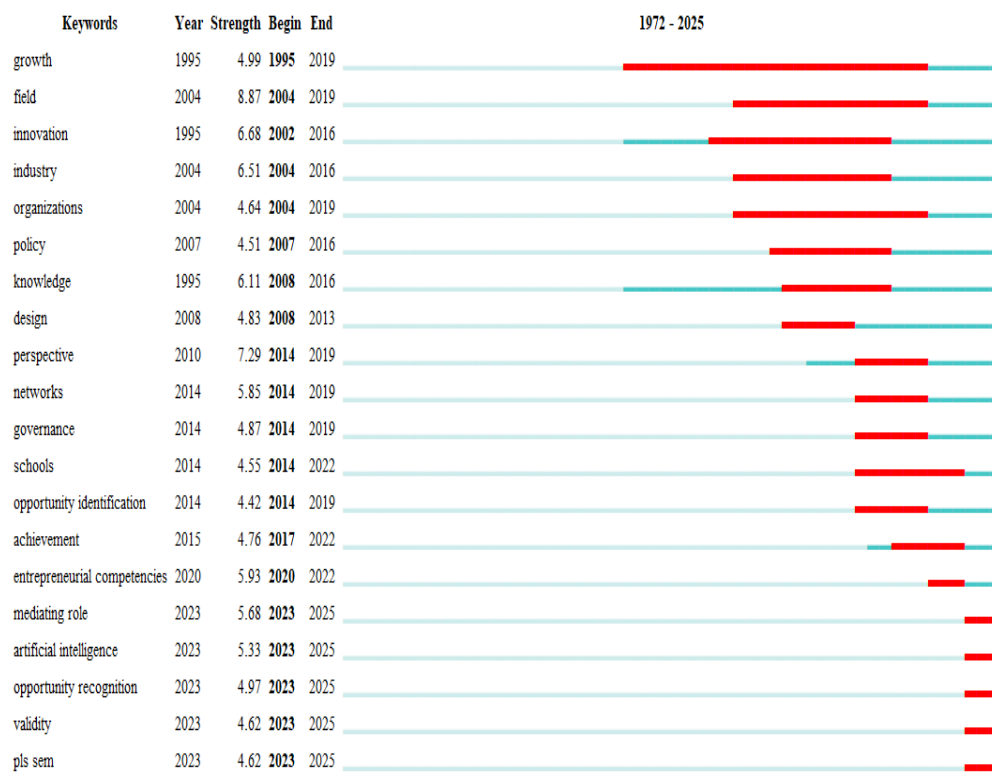
One contextual interpretation is that the CNKI corpus reflects a stronger reform and implementation orientation, whereas the WoS corpus reflects a stronger mechanism and evaluation orientation. This interpretation is consistent with the observed vocabulary and cluster composition. It remains an inference because the analysis does not directly measure policy regimes, institutional incentives, disciplinary norms, or author motivations.

**Table 2. Ten Highest-Frequency Keywords in the WoS and CNKI Corpora**

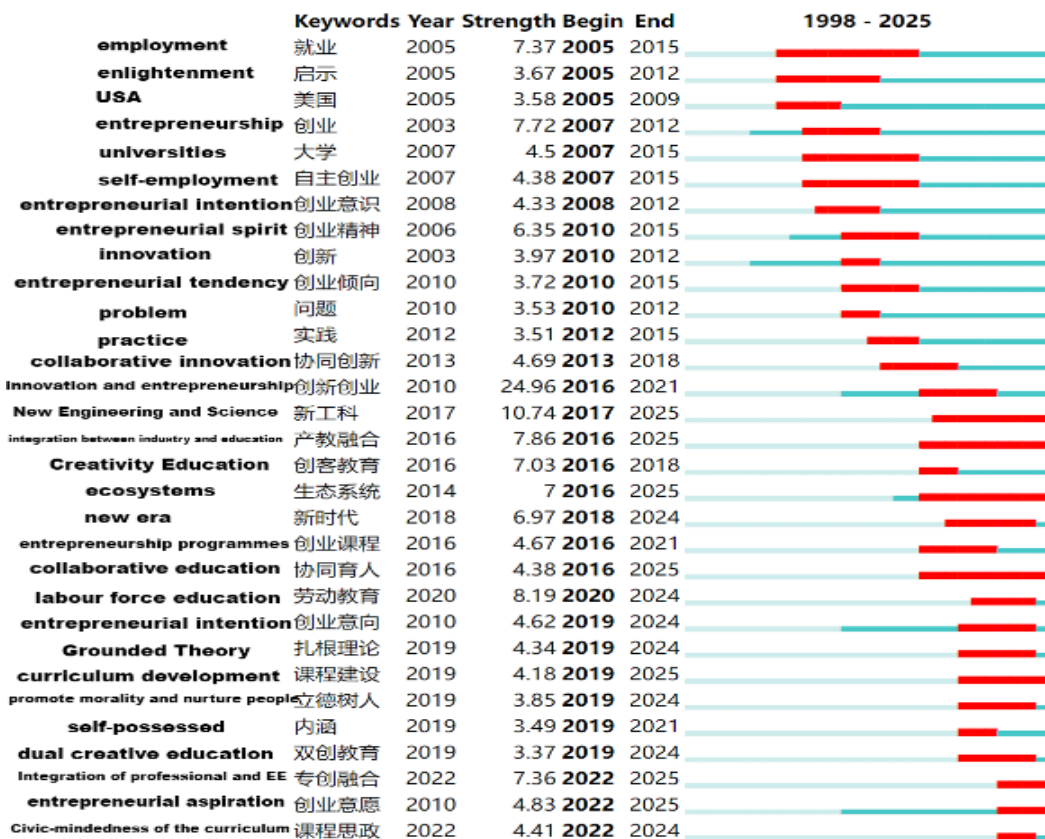
| Frequency | Centrality | Year | Keywords                        |
|-----------|------------|------|---------------------------------|
| WoS       |            |      |                                 |
| 946       | 0.17       | 2008 | entrepreneurship education      |
| 394       | 0.01       | 2014 | impact                          |
| 383       | 0.23       | 2014 | entrepreneurial intention       |
| 372       | 0.08       | 2008 | entrepreneurship                |
| 304       | 0.07       | 2011 | higher education                |
| 256       | 0.1        | 2011 | students                        |
| 252       | 0.08       | 2014 | self-efficacy                   |
| 252       | 0.07       | 1995 | performance                     |
| 242       | 0.09       | 2008 | model                           |
| 172       | 0.12       | 2011 | knowledge                       |
| CNKI      |            |      |                                 |
| 979       | 0.53       | 1999 | entrepreneurship education      |
| 405       | 0.21       | 2002 | university and college student  |
| 248       | 0.06       | 2002 | universities and colleges       |
| 234       | 0.12       | 2010 | innovation and entrepreneurship |
| 127       | 0.04       | 2003 | entrepreneurship                |
| 121       | 0.15       | 2002 | talent cultivation              |
| 87        | 0.16       | 2001 | entrepreneurial competence      |
| 80        | 0.21       | 1999 | higher education                |
| 67        | 0.07       | 2008 | vocational colleges             |
| 66        | 0.1        | 2010 | entrepreneurial intention       |

### Keyword Burst Patterns and Temporal Shifts (RQ3)

Keyword burst analysis identifies terms whose frequency increases sharply within a defined period (Dang et al., 2021). CiteSpace identified 20 burst keywords in the WoS corpus and 31 in the CNKI corpus (Figures 5a-5b). Burst strength and duration were used to compare temporal shifts in research attention within the two corpora.



(a)



(b)

Figure 5. Keyword burst results for (a) the WoS corpus and (b) the CNKI corpus.

The WoS bursts move from broad topics such as innovation, industry, and policy towards governance and network perspectives. More recent burst terms include validity, PLS-SEM, mediation, and artificial intelligence. Within this corpus, the pattern indicates growing attention to measurement, model-based empirical analysis, and technology-related educational settings.

The CNKI bursts move from employment and university-oriented goals towards system-building themes such as industry-education integration, ecosystems, and collaborative education. Later terms include curriculum development, new engineering education, and course-based ideological education. This sequence is consistent with sustained attention to the position of entrepreneurship education within curriculum and institutional reform.

The two corpora share a higher education and student focus but show different recent burst profiles. The WoS corpus gives greater visibility to measurement, model-based analysis, and emerging technology. The CNKI corpus gives greater visibility to curriculum governance and institutional implementation. Table 3 distinguishes the bibliometric evidence from its contextual interpretation.

Table 3. Evidence-Based Summary of Corpus-Level Similarities and Differences

| Dimension                 | WoS-indexed corpus                                       | CNKI-CSSCI corpus                                                                 | Evidential status                                                      |
|---------------------------|----------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------|
| Shared core               | Higher education; students; entrepreneurship education   | Higher education; students; entrepreneurship education                            | Frequency and centrality patterns; descriptive                         |
| Thematic emphasis         | Self-efficacy, impact, performance; model-based analysis | Talent cultivation; entrepreneurial competence; innovation and entrepreneurship   | Keyword frequency, co-occurrence, and cluster composition; descriptive |
| Recent burst terms        | Validity; PLS-SEM; mediation; artificial intelligence    | Industry-education integration; curriculum development; new engineering education | Burst timing; attention rather than effectiveness                      |
| Contextual interpretation | Mechanism and evaluation orientation                     | Reform and implementation orientation                                             | Interpretive inference; no causal or national attribution              |

### Complementary Citation Profiles (RQ4)

The citation-based analyses answer different parts of RQ4 and are reported separately. WoS co-citation clustering identified relational groupings labelled knowledge, entrepreneurial intention, and engineering education. Table 4 lists two representative publications from each selected cluster. The cluster labels and representative publications characterize intellectual groupings within the WoS corpus. They do not constitute a ranking of the most influential individual papers.

The cluster labelled “knowledge” includes research on entrepreneurship education, self-efficacy, changing employment conditions, and the digital transformation of work. Nowiński et al. (2019) has investigated through self-efficacy, whether EE influences EI in Visegrád countries. Ratten & Usmanij (2021) reviewed current directions in entrepreneurship education and linked the field to emerging employment trends, including the gig economy and the digital transformation of the workplace.

The “entrepreneurial intention” cluster includes research on the relationship between entrepreneurship education, attitudes, and entrepreneurial intention. Bae et al. (2014) synthesized evidence on the relationship between entrepreneurship education and entrepreneurial intention. Fayolle & Gailly (2015) examined changes in entrepreneurial attitudes and intention in relation to entrepreneurship education, prior experience, and time. The cluster reflects the prominence of intention-based outcomes in the WoS corpus.

The cluster was labelled “engineering education” by CiteSpace. Its representative publications address the theoretical foundations and pedagogy of entrepreneurship education. Fayolle et al. (2016) discussed the theoretical and methodological foundations and legitimacy of entrepreneurship education research. Robinson et

al. (2016) examined entrepreneurship education pedagogy and argued for a shift from teacher-led approaches towards student-centred, experiential, and lifelong learning.

**Table 4. Representative Publications from Selected WoS Co-citation Clusters**

| ClusterID                                | Author(s)                                                                           | Year | Title                                                                                                                                                              | Source                                            |
|------------------------------------------|-------------------------------------------------------------------------------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| Cluster 1#<br>knowledge                  | Nowiński, W.,<br>Haddoud, M. Y.,<br>Lančarič, D.,<br>Egerová, D., &<br>Czeglédi, C. | 2019 | The impact of entrepreneurship education, entrepreneurial self-efficacy and gender on entrepreneurial intentions of university students in the Visegrad countries. | Studies in Higher Education                       |
|                                          | Ratten, V., &<br>Usmanij, P.                                                        | 2021 | Entrepreneurship education: Time for a change in research direction?                                                                                               | The International Journal of Management Education |
| Cluster 2#<br>entrepreneurial intentions | Fayolle, A., &<br>Gailly, B.                                                        | 2015 | The impact of entrepreneurship education on entrepreneurial attitudes and intention: Hysteresis and persistence.                                                   | Journal of Small Business Management              |
|                                          | Bae, T. J., Qian, S.,<br>Miao, C., & Fiet, J. O.                                    | 2014 | The relationship between entrepreneurship education and entrepreneurial intentions: A meta-analytic review.                                                        | Entrepreneurship Theory and Practice              |
| Cluster 3#<br>engineering education      | Fayolle, A., Verzat, C., & Wapshott, R.                                             | 2016 | In Quest of Legitimacy: The Theoretical and Methodological Foundations of Entrepreneurship Education Research.                                                     | International Small Business Journal              |
|                                          | Robinson, S.,<br>Neergaard, H.,<br>Tanggaard, L., &<br>Krueger, N. F.               | 2016 | New horizons in entrepreneurship education: from teacher-led to student-centered learning.                                                                         | Education + training                              |

CNKI citation rankings provide a different form of evidence. At the retrieval date, the five most-cited records in the retained CNKI corpus addressed new engineering education, university practice models, the integration of entrepreneurship and professional education, innovative talent cultivation, and broad-spectrum innovation and entrepreneurship education (Table 5). The citation counts are specific to the CNKI platform and may reflect publication age, journal visibility, and database coverage. They are not compared numerically with the WoS co-citation clusters and do not establish an equivalent cross-database influence hierarchy.

**Table 5. Five Most-Cited Papers in the CNKI Corpus (CNKI Citation Counts)**

| Count | Year | Publication                                                                                                                                                                                                            |
|-------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1900  | 2017 | Wu, A. H. et al. (2017). Accelerating the development and construction of new engineering disciplines to proactively adapt to and lead the new economy. <i>Research in Higher Education of Engineering</i> , (01),1-9. |
| 883   | 2015 | Ma, Y. B. & Bai, Z. (2015). Research and exploration on the practice mode of innovation and entrepreneurship education in universities. <i>Tsinghua Journal of Education</i> , 36(06), 99-103.                         |

|     |      |                                                                                                                                                                                              |
|-----|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 679 | 2013 | Huang, Z. X. & Wang, Z. Q. (2013). On the integration of entrepreneurship education and professional education in colleges and universities. <i>Educational Research</i> , 34(12), 59-67.    |
| 672 | 2015 | Yang, X. H. (2015). Research on entrepreneurship education and cultivation of innovative talents in Chinese colleges and universities. <i>China Higher Education Research</i> , (01), 39-44. |
| 653 | 2015 | Wang, Z. R. (2015). The system structure and theoretical value of “broad-spectrum” innovation and entrepreneurship education. <i>Educational Research</i> , 36(05), 56-63.                   |

### From Corpus-Level Patterns to a CMO Research Agenda (RQ5)

Within the sampled corpora, the combined keyword, cluster, and burst evidence suggest two broad orientations: reform and implementation in the CNKI corpus, and mechanism and evaluation in the WoS corpus. These orientations summarize differences in thematic emphasis. They are not mutually exclusive categories. The analysis does not demonstrate that national institutions or policies produced them.

The CMO framing is introduced here as a conceptual research agenda. Realist-informed research examines what works, how, for whom, and under which conditions (Pawson & Tilley, 1997). Contexts are conditions that enable or constrain a program. Mechanisms concern how program resources interact with participants’ reasoning and responses. Outcomes are intended or unintended changes at individual, organizational, or system levels (De Weger et al., 2020; Dalkin et al., 2015). In entrepreneurship education research, context may include curriculum governance, institutional support, access to mentors, and industry collaboration. Candidate mechanism-related processes may include changes in self-efficacy, opportunity recognition, and learning engagement. These constructs should not be labelled as mechanisms without evidence showing how program resources alter participants’ reasoning or actions. Outcomes may include competence, intention, persistence, early entrepreneurial action, or venture-related results. Future studies should specify the level, timing, and measurement of each element.

The proposed CMO agenda is organized around three propositions for future empirical testing. P1: The association between entrepreneurship education provision and learner outcomes varies across institutional and program contexts. P2: The relationship between program resources and learner outcomes depends on whether those resources activate identifiable changes in learners’ reasoning or responses. P3: Program outcomes vary across learner groups and institutions, even when program provision is similar.

These propositions are not findings of the present study. They translate the corpus-level contrasts into a set of relationships for future empirical examination. Longitudinal, multi-level, experimental, and realist-informed studies could assess their temporal ordering and heterogeneity. Such tests require explicit CMO specifications and comparable outcome measures.

## CONCLUSION

This study compared a Chinese-language CSSCI corpus indexed in CNKI with an English-language corpus indexed in the WoS Core Collection. Publication trends, keyword co-occurrence, clustering, and burst analysis revealed different trajectories and thematic profiles. CNKI publication counts increased rapidly after 2007 and reached their highest observed level in 2017. WoS-indexed publication counts continued to increase through 2024. Because the searches were completed in March 2025, the partial 2025 counts were not used to interpret annual growth, peaks, or declines.

Both corpora share a thematic core centred on higher education, students, and entrepreneurship education. Within this shared core, the WoS corpus gives greater prominence to self-efficacy, impact, performance, measurement, and model-based analysis. The CNKI corpus gives greater prominence to talent cultivation, curriculum governance, industry-education integration, and institutional implementation. These patterns characterize the retrieved and screened corpora.

The thematic contrast suggests a reform and implementation orientation in the CNKI corpus and a mechanism and evaluation orientation in the WoS corpus. These orientations are contextual interpretations of the observed patterns. The citation analyses provide two distinct forms of evidence. WoS co-citation clusters describe relationships among cited references, while CNKI rankings indicate citation prominence on the CNKI platform. The CMO framework synthesizes these thematic patterns into a conceptual research agenda. Its proposed relationships require empirical testing in future studies.

### Implications, Limitations, and Future Research

This study has several limitations typical of comparative bibliometric research. First, it relies on two database-specific corpora and on keyword-based network construction. The WoS corpus is restricted to English-language articles indexed in the WoS Core Collection, while the CNKI corpus is restricted to Chinese-language CSSCI articles in the education category. Neither corpus provides comprehensive coverage of entrepreneurship education research produced in China or internationally. The search strings are conceptually related but not identical. The WoS query includes the broad term “entrepreneurship,” whereas the CNKI query includes “innovation and entrepreneurship education.” This difference may have affected the composition of the two corpora. Although screening and concept alignment were used to improve comparability, differences in indexing rules, citation practices, and keyword conventions may still affect the results. The original screening record did not distinguish topical exclusions from duplicate removal, which limits retrospective reproducibility. Second, the 2025 documents are incomplete and should not be over-interpreted, especially in trend discussions. Third, the citation-based analyses used different procedures and must be interpreted separately. WoS was examined through co-citation clustering, whereas CNKI was examined through the coding of highly cited publications. These methods do not provide equivalent measures of intellectual influence. Fourth, co-occurrence and burst analyses identify patterns of thematic prominence and temporal change within each corpus. The study was not designed to evaluate the effectiveness of entrepreneurship education interventions.

Despite these limitations, the study offers useful implications. For policymakers and university leaders, the findings provide a descriptive map of reform-related themes in the CNKI corpus, particularly governance, collaboration, curriculum integration, and system construction. This map identifies areas of research attention but does not evaluate the effectiveness of policies or educational practices. For researchers, the WoS corpus gives greater prominence to mechanisms, outcomes, measurement, and recent artificial intelligence-related topics. These patterns can help researchers locate future studies within the sampled literature.

Future research can extend this study by including additional databases, such as Scopus, applying full-text topic modelling, and conducting mixed-method follow-up studies through expert coding and qualitative synthesis. Future replications should also record exclusion reasons at the document level and test the sensitivity of the findings to broader and narrower search strings. Empirical studies can evaluate the proposed CMO research agenda by specifying curriculum and governance arrangements as contextual conditions, identifying candidate learning mechanisms, and measuring outcomes across institutional settings. Because artificial intelligence appeared among the recent WoS burst terms, future studies could examine specific AI-supported teaching designs, such as simulations and learning analytics.

### REFERENCES

1. Bae, T. J., Qian, S., Miao, C., & Fiet, J. O. (2014). The Relationship between Entrepreneurship Education and Entrepreneurial Intentions: A Meta-Analytic Review. *Entrepreneurship Theory and Practice*, 38(2), 217–254. <https://doi.org/10.1111/etap.12095>
2. Chen, C., Dubin, R., & Kim, M. C. (2014). Orphan drugs and rare diseases: A scientometric review (2000 – 2014). *Expert Opinion on Orphan Drugs*, 2(7), 709–724. <https://doi.org/10.1517/21678707.2014.920251>
3. Chen, X., & Liu, Y. (2020). Visualization analysis of high-speed railway research based on CiteSpace. *Transport Policy*, 85, 1–17.
4. Cheng, Z., Xie, Y., & Wen, H. (2022). Visualization analysis of research on climate innovation on CiteSpace. *Frontiers in Environmental Science*, 10, 1025128.
5. Chopra, M., Saini, N., Kumar, S., Varma, A., Mangla, S. K., & Lim, W. M. (2021). Past, present, and

- future of knowledge management for business sustainability. *Journal of Cleaner Production*, 328, 129592. <https://doi.org/10.1016/j.jclepro.2021.129592>
6. Dalkin, S. M., Greenhalgh, J., Jones, D., Cunningham, B., & Lhussier, M. (2015). What's in a mechanism? Development of a key concept in realist evaluation. *Implementation Science*, 10(1), 49. <https://doi.org/10.1186/s13012-015-0237-x>
7. Dang, Q., Luo, Z., Ouyang, C., Wang, L., & Xie, M. (2021). Intangible Cultural Heritage in China: A Visual Analysis of Research Hotspots, Frontiers, and Trends Using CiteSpace. *SUSTAINABILITY*, 13(17), 9865. <https://doi.org/10.3390/su13179865>
8. De Weger, E., Van Vooren, N. J. E., Wong, G., Dalkin, S., Marchal, B., Drewes, H. W., & Baan, C. A. (2020). What's in a realist configuration? Deciding which causal configurations to use, how, and why. *International Journal of Qualitative Methods*, 19, 1609406920938577. <https://doi.org/10.1177/1609406920938577>
9. Do Nguyen, Q., & Nguyen, H. T. (2023). Entrepreneurship education and entrepreneurial intention: The mediating role of entrepreneurial capacity. *The International Journal of Management Education*, 21(1), 100730.
10. Fayolle, A., & Gailly, B. (2015). The Impact of Entrepreneurship Education on Entrepreneurial Attitudes and Intention: Hysteresis and Persistence. *Journal of Small Business Management*, 53(1), 75–93. <https://doi.org/10.1111/jsbm.12065>
11. Fayolle, A., Verzat, C., & Wapshott, R. (2016). In quest of legitimacy: The theoretical and methodological foundations of entrepreneurship education research. *International Small Business Journal: Researching Entrepreneurship*, 34(7), 895–904. <https://doi.org/10.1177/0266242616649250>
12. Georgescu, M.-A., & Herman, E. (2020). The impact of the family background on students' entrepreneurial intentions: An empirical analysis. *Sustainability*, 12(11), 4775. <https://doi.org/10.3390/su12114775>
13. Han, Y., & Liang, Y. (2023). Scientific Knowledge Map Study of Therapeutic Landscapes and Community Open Spaces: Visual Analysis with CiteSpace. *Sustainability*, 15(20), 15066. <https://doi.org/10.3390/su152015066>
14. Klarin, A. (2024). How to conduct a bibliometric content analysis: Guidelines and contributions of content co-occurrence or co-word literature reviews. *International Journal of Consumer Studies*, 48(2), e13031. <https://doi.org/10.1111/ijcs.13031>
15. Liñán, F., & Fayolle, A. (2015). A systematic literature review on entrepreneurial intentions: Citation, thematic analyses, and research agenda. *International Entrepreneurship and Management Journal*, 11(4), 907–933. <https://doi.org/10.1007/s11365-015-0356-5>
16. Lund, B., & Ma, J. (2021). A review of cluster analysis techniques and their uses in library and information science research: K-means and k-medoids clustering. *Performance Measurement and Metrics*, 22(3), 161–173.
17. Mohamed, N. A., & Ali, A. Y. S. (2021). Entrepreneurship education: Systematic literature review and future research directions. *World Journal Of Entrepreneurship Management And Sustainable Development*, 17(4), 644–661. <https://doi.org/10.1108/WJEMSD-07-2020-0084>
18. Muñoz, M. A. C., Devece, C., & Ortiz, M. P. (2024). University-level entrepreneurship education: A bibliometric review using Tree of Science. *Multidisciplinary Journal for Education, Social and Technological Sciences*, 11(1), 1–19.
19. Newman, M. E. J. (2004). Fast algorithm for detecting community structure in networks. *Physical Review E*, 69(6), 066133. <https://doi.org/10.1103/PhysRevE.69.066133>
20. Nowiński, W., Haddoud, M. Y., Lančarič, D., Egerová, D., & Czeglédi, C. (2019). The impact of entrepreneurship education, entrepreneurial self-efficacy and gender on entrepreneurial intentions of university students in the Visegrad countries. *Studies in Higher Education*, 44(2), 361–379. <https://doi.org/10.1080/03075079.2017.1365359>
21. Pawson, R., & Tilley, N. (1997). Realistic evaluation. <https://www.torrossa.com/gs/resourceProxy?an=5409538&publisher=FZ7200>
22. Pittaway, L., & Cope, J. (2007). Entrepreneurship Education: A Systematic Review of the Evidence. *International Small Business Journal: Researching Entrepreneurship*, 25(5), 479–510. <https://doi.org/10.1177/0266242607080656>
23. Ratten, V., & Usmanij, P. (2021). Entrepreneurship education: Time for a change in research direction?

- The International Journal of Management Education, 19(1), 100367. <https://doi.org/10.1016/j.ijme.2020.100367>
24. Robinson, S., Neergaard, H., Tanggaard, L., & Krueger, N. F. (2016). New horizons in entrepreneurship education: From teacher-led to student-centered learning. *Education+ Training*, 58(7/8), 661–683. <https://doi.org/10.1108/ET-03-2016-0048>
  25. Su, X., Li, X., & Kang, Y. (2019). A Bibliometric Analysis of Research on Intangible Cultural Heritage Using CiteSpace. *Sage Open*, 9(2), 2158244019840119. <https://doi.org/10.1177/2158244019840119>
  26. Thomas, O. (2023). Entrepreneurship education: Which educational elements influence entrepreneurial intention? *Industry and Higher Education*, 37(3), 328–344. <https://doi.org/10.1177/09504222221121065>
  27. Wan, N., & Lv, X. (2021). A bibliometric analysis on the landscape of entrepreneurship education in higher education (2001–2020). *Entrepreneurship Education*, 4(4), 375–402. <https://doi.org/10.1007/s41959-021-00062-8>
  28. Wu, H, Ge, W, & He, J. (2020). The impact of teacher support on the intention to continue learning MOOC courses: A perspective based on S-O-R and TAM. *Modern Distance Education*, (03). <https://doi.org/doi:10.13927/j.cnki.yuan.20200629.002>.
  29. Wu, L., Jiang, S., Wang, X., Yu, L., Wang, Y., & Pan, H. (2022). Entrepreneurship education and entrepreneurial intentions of college students: The mediating role of entrepreneurial self-efficacy and the moderating role of entrepreneurial competition experience. *Frontiers in Psychology*, 12, 727826. <https://doi.org/10.3389/fpsyg.2021.727826>
  30. Xia, T., Shumin, Z., & Yifeng, W. (2016). Status Quo and Outlook of the Studies of Entrepreneurship Education in China: Statistics and Analysis Based on Papers Indexed in CSSCI (2004–2013). *Chinese Education & Society*, 49(3), 217–227. <https://doi.org/10.1080/10611932.2016.1218255>
  31. Zhao, X., Nan, D., Chen, C., Zhang, S., Che, S., & Kim, J. H. (2023). Bibliometric study on environmental, social, and governance research using CiteSpace. *FRONTIERS IN ENVIRONMENTAL SCIENCE*, 10, 1087493. <https://doi.org/10.3389/fenvs.2022.1087493>
  32. Zheng, Y. (2018). The past, present and future of research on Chinese entrepreneurship education: A bibliometric analysis based on CSSCI journal articles. *Educational Sciences: Theory & Practice*, 18(5), 1255–1276. <https://doi.org/10.12738/estp.2018.5.025>