

How Undergraduates Should Write Their First Review Paper - An Example from Bibliometric Research

Yile Yu, Yule He, Tiancheng He*

1.Zhejiang University of Technology, Hangzhou, 10337, China

2.University of Ningbo, Ningbo, 11646, China

*Corresponding author: Tiancheng He

Copyright: 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY-NC 4.0), permitting distribution and reproduction in any medium, provided the original author and source are credited, and explicitly prohibiting its use for commercial purposes.

Abstract: Cultivating undergraduate research ability has become an important direction of global higher education reform. However, undergraduates new to academic paper writing generally face problems such as difficulty in selecting a topic to focus on, rustiness in methodology and tools, and weaknesses in academic expression. To address these challenges and difficulties, this study systematically analyzed the research conditions of undergraduates and designed the URCSAS framework for undergraduates to assess their research conditions. Based on undergraduates' research conditions and the characteristics of various types of reviews, the feasibility of publication was innovatively taken into account, and the results of the analysis showed that the bibliometric literature review was the most cost-effective and publishable type of paper for undergraduates. This study then designed a practical path to guide undergraduates in completing their bibliometric literature review papers, including preparation and writing, to provide a reliable path and program to improve undergraduates' research ability and academic enlightenment.

Keywords: Undergraduate Research; Higher Education; Bibliometrics; Literature review

Published: Jun 4, 2025

DOI:<https://doi.org/10.62177/chst.v2i2.381>

1.Introduction

1.1 Research background

Over the years, against the backdrop of the national “Double First-Class” initiative, universities have continuously strengthened their emphasis on cultivating innovative talents. An increasing number of undergraduates have achieved academic enlightenment by participating in scientific research projects, subject competitions, and academic paper writing.

^[1] At present, the construction of modernization with Chinese characteristics is in full swing, and the role of the integrated strategy of “education - science and technology - talent” is prominent. In university education, the academic training and the cultivation of scientific and technological literacy for ordinary students are particularly crucial. However, it is found that undergraduates are generally faced with the problems of difficulty in selecting topics, rusty methods and tools, and tenderness in academic expression when they first come into contact with academic paper writing.^[2] Especially in literature review papers, students are prone to fall into the misunderstanding of simply piling up literature or subjective reviews, lacking the guidance of systematic analysis framework. Bibliometrics, as a tool to quantitatively analyse the distribution of academic results and the evolution of knowledge, provides a structured research path for academic newcomers due to its standardized data sources and intuitive visual presentation.^[3] The application value of the methodology has been recognized by the

academic community for its application in medicine, pedagogy and other fields. Introducing bibliometrics into the guidance of undergraduate thesis writing can not only cultivate their data-driven critical thinking, but also avoid the overly high theoretical depth requirements for beginners in traditional reviews, which has significant teaching appropriateness.

1.2 Research objective

This study aims to construct an operational framework for bibliometric review writing for undergraduate students. The specific goals include: (1) Analyze the research characteristics of undergraduate students and design a framework that they can use for self-evaluation. (2) Comprehensively analyze and compare the features of various literature reviews. (3) With the aim of guiding undergraduate students to complete a bibliometric literature review that conforms to academic norms, design a feasible and complete practical path.

1.3 Statement of data sources

This article does not involve private data. All data and discussions are sourced from public databases such as web of science and CNKI. All citations are marked with their sources.

2. Literature review

A literature review, as an important component of academic writing, serves as both an introductory phase to academic research and a crucial stage for undergraduates to showcase their research abilities. Existing studies indicate that a well-conducted literature review not only helps undergraduates build a foundational understanding of a specific research field but also fosters their critical thinking and research skills throughout the research process. In terms of the structure and writing methods of a literature review, some scholars believe that a good literature review should not only “synthesize” but also integrate “describe” and “evaluate”. For example, Ma Defeng et al. (2023) provided a detailed discussion on the four common pitfalls encountered in writing a literature review, highlighting key considerations in each stage: “selection”, “synthesis”, “description” and “presentation.”^[4] The study by Li Ye et al. (2024), which is based on the social/cognitive genre model, examined how critical thinking is expressed in literature reviews and its developmental characteristics, offering a new perspective for academic writing.^[5] In the practice of writing literature reviews, scholars researching the representational thinking of academic novices in the literature review sections of theses have pointed out the issue of “only synthesizing without describing,” highlighting the importance of balancing “synthesis” and “description” in the review section.

3. Analysis of undergraduate research characteristics

3.1 Cognitive load and information processing characteristics

Undergraduate students show significant stratification in their perceived level of academic tasks.^[6] In the initial stage, undergraduates tend to be “task completion-oriented,” focusing on the breadth rather than the depth of information collection, making them prone to superficial information integration. In the middle stage, due to the simultaneous conduct of multi-threaded tasks, such as theoretical reasoning, methodological practice and the expression of results, the contradiction in the allocation of cognitive resources comes to the fore. In the later stage, the need for goal revision and results iteration creates pressure for retrospective cognitive restructuring. Specifically, when revising their papers, they encounter issues like data deficiencies and theoretical misapplications, necessitating substantial modifications. This dynamic fluctuation in cognitive load is directly related to the fact that learners have not yet established a stable framework for academic thinking, and their information processing patterns are often characterized by fragmentation and disorganization.

3.2 Variations in the adaptability of technological tools

Learners’ ability to adapt to technological tools is limited by their methods of cognitive representation. Graphical interface tools can quickly activate students’ ability to transfer experiences and form positive cognitive feedback because of their preference for embodied cognition, while tools that require abstract logical deduction (e.g., parameterized settings, hierarchical menu systems) can cause operational anxiety because they are beyond their immediate cognitive load-bearing capacity. This difference essentially reflects the transitional characteristics of learners moving from concrete experience to abstract thinking, as well as how well the design of technological tools aligns with students’ cognitive schemes.^[7]

3.3 Pathways to Internalizing Academic Norms

Undergraduates' mechanical memorization of norms can form operational inertia through repetitive training, but the deeper norms related to academic ethics mostly remain at the conceptual level due to the lack of practical contextual support. This gap in internalization leads to frequent occurrences of phenomena in academic writing that are formally compliant but logically contradictory, such as complete citation marks paired with broken chains of argumentation, or standardized data presentation with only a singular analytical dimension. The incomplete internalization of norms becomes a critical bottleneck in the transition of academic identity.

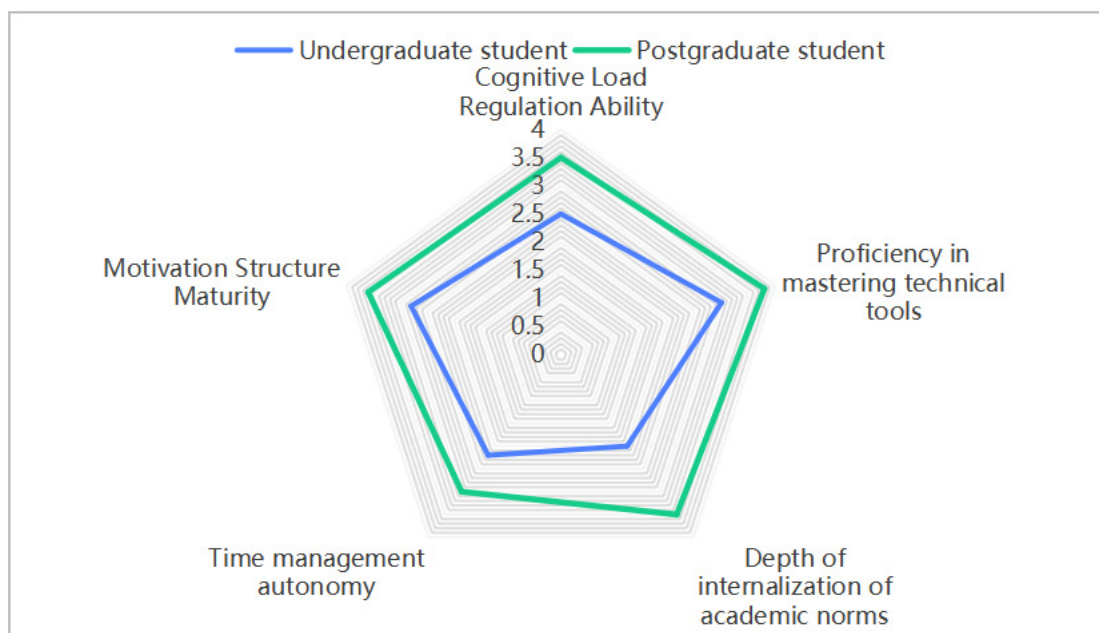
3.4 Nonlinear Aspects of Time Management

The allocation of research time for undergraduates exhibits two nonlinear characteristics: "loose at the beginning and tight at the end" and "tight at the beginning and loose at the end." The "loose at the beginning and tight at the end" pattern occurs when tasks are initially delayed due to unclear objectives and uncertain methods, leading to a high-intensity focus in the middle and later stages as deadlines approach. The "tight at the beginning and loose at the end" pattern describes a situation where substantial effort and time are invested in the early stages of research, but completely or repeated rejection of the initial draft by the advisor can result in learning fatigue and a loss of confidence. These phenomena indicate that undergraduates new to research often lack a sufficient understanding of the interconnections between different stages of the research process.

3.5 Dual-Drive of Motivation Generation

Undergraduate students' motivation to engage in scientific research activities is driven by both external instrumentalism and intrinsic cognition.^[8] Although external incentives can effectively stimulate students' initial involvement in research, they have limited impact on sustaining deep academic engagement. Bibliometrics, by visualizing research outcomes, transforms the abstract research process into tangible cognitive products, allowing students to perceive the trajectory of their academic skill development, thereby maintaining their interest in research. This immediate, visual cognitive feedback, combined with the sense of control gained from using tools, creates a mechanism that strengthens intrinsic motivation, and then helps alleviate the value anxiety experienced by academic novices due to a lack of theoretical depth and encourages their transition from mere task executors to active research explorers.

Figure 1 Radar Chart Comparing the Research Characteristics of Undergraduates and Postgraduates



4. Types of Review Papers

Review papers can be divided into various types according to the research purpose, methodology and application scenarios, mainly including Bibliometric Review, Meta-analysis Review and Systematic Review. Several major types are described in detail below:

4.1 Bibliometric Review

Bibliometric Review is a kind of review methods based on quantitative statistical analysis. It reveals the development trends of disciplines, research hotspots, and the structure of knowledge networks by mining large-scale data from literature databases.

This method often employs information visualization tools such as CiteSpace, VOSviewer, or HistCite to analyze aspects like publication years, author collaboration networks, keyword co-occurrence, and citation relationships.^[9] For instance, Keyword Clustering can identify the core themes within a specific field, while Burst Detection can track the dynamic evolution of research hotspots. Bibliometric reviews are effective for understanding the developmental trajectory of a discipline from a macro perspective and are commonly used in areas such as scientific research policy formulation and discipline competitiveness evaluation. However, their capacity to explore the deeper logical content of the literature is relatively limited.

4.2 Meta-analysis Review

Meta-analysis Review, centered on quantitative synthesis, integrates the Effect Size of independent studies statistically to derive more universally applicable conclusions. This method must be conducted in strict adherence to standardized procedures, including study selection, heterogeneity testing, effect model selection, and publication bias assessment.^[10] For instance, in the medical field, meta-analysis is often used to evaluate the efficacy of drugs or interventions. Its advantage lies in enhancing statistical efficiency and the objectivity of results. However, it requires a high degree of homogeneity and quality in the original studies. If the included studies exhibit heterogeneity or bias, it may lead to distorted conclusions.

4.3 Systematic Review

Systematic reviews are characterized by a transparent and reproducible methodology, aiming to comprehensively collect, evaluate, and synthesize existing evidence on a specific research question. The core steps include defining the research question (using the PICO framework: Population, Intervention, Comparison, Outcome), developing a search strategy, setting inclusion and exclusion criteria for literature, conducting quality assessments (such as using the ROBIS tool), and synthesizing data. This method typically follows the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) reporting guidelines and presents results through qualitative or quantitative means, such as meta-analysis.^[11] Systematic Review is widely used in the fields of clinical medicine, education, and social sciences, particularly holding a significant position in evidence grading systems. However, they are time-consuming and require a high level of methodological proficiency from researchers.

4.4 Other types

In addition to the aforementioned types, review papers also include Narrative Reviews, which focus primarily on traditional inductive synthesis, providing an overview of the field rather than emphasizing methodological rigor; Scoping Reviews are used to define the scope and conceptual framework of a research area; and Rapid Reviews provide preliminary evidence for policy-making within a limited time-frame. Researchers should select the appropriate type based on their objectives, such as employing bibliometrics to explore emerging trends, while prioritizing meta-analysis and systematic reviews for verifying intervention effects.

5.Characteristics of Review Papers

5.1 Criticality of various literature reviews

The rigor of a literature review is determined by the normative nature of the research design, the depth of data integration, and the reliability of the conclusions. The order of rigor for six common types is as follows: Systematic Review > Meta-analysis Review ≈ Bibliometrics Review > Scoping Review > Rapid Review > Narrative Review. Systematic reviews are bench-marked against the PRISMA framework, ensuring comprehensiveness and reproducibility of evidence through transparent processes (e.g., two-person literature screening, multi-database searches, risk of bias assessment), and have become the “gold standard” for the integration of high-quality evidence in the fields of medicine and education. While meta-analyses rely on statistical models, such as effect size aggregation and heterogeneity testing, to enhance the objectivity of conclusions, their rigor is limited by the homogeneity and quality of the original studies. If the original data are biased, there is a risk of distortion, often summarized as “garbage in, garbage out.” Bibliometric reviews use tools like CiteSpace to

quantitatively explore disciplinary trends, which are objective and efficient in macro-dynamic analysis but struggle to deeply interpret the logical content of the literature. Scoping reviews, guided by the Arksey & O' Malley framework, are suitable for exploring emerging topics, but their descriptive goals and non-conclusive nature limit methodological depth. Rapid reviews compress processes for timeliness, such as simplified searches and single screenings, which can support decision-making in emergencies but at the cost of comprehensiveness. Narrative reviews rely entirely on the author's subjective synthesis, lacking standardized processes, and are the least rigorous but suitable for knowledge dissemination.

In summary, high-rigor methods (Systematic Review, Meta-analyses Review) are suitable for hypothesis testing and policy formulation, medium-rigor methods (Bibliometrics Review, Scoping Review) excel in trend exploration, while low-rigor methods (Rapid Review, Narrative Review) are more practical for time-sensitive needs or preliminary research. Researchers must balance the strength of evidence, resource constraints, and research objectives, avoiding the blind pursuit of methodological complexity to achieve a balance between scientific rigor and efficiency.

5.2 Comparison of the Characteristics of Various Literature Reviews

The methods of academic research are becoming increasingly diverse, and literature reviews are no longer mere "compilations of articles." Systematic reviews, meta-analyses reviews, scoping reviews, and bibliometric reviews each have their own characteristics and value. For undergraduates, choosing which type of review to conduct involves balancing academic rigor, technical simplicity, and the utility of research outcomes. Systematic reviews can provide highly reliable evidence, but they are time-consuming and demanding, making them impractical for undergraduates. Meta-analyses also require complex statistical skills. In contrast, bibliometric reviews use tools to process data, aligning with academic standards while being easy to execute, thus resolving the conflict between academic requirements and usability. A specific comparison is shown in Table 1 and Table 2.

Table 1 Characteristics of Various Literature Reviews (1)

Type	Methodology	Data Source	Analysis Approach
Bibliometric Review	Quantitative statistical and visual analysis based on literature databases	Large-scale literature databases (e.g., Web of Science, Scopus)	Quantitative (using statistical and visualization tools)
Meta-Analysis Review	Statistical synthesis of effect sizes from independent studies	Published quantitative research data (e.g., RCT results)	Quantitative (using statistical models)
Systematic Review	Comprehensive collection, evaluation, and synthesis of evidence following standardized procedures	Various types of literature (qualitative and quantitative research)	Qualitative or Quantitative (e.g., Meta-analysis)
Narrative Review	Summarization of field advancements based on the author's experience	Collection of literature without strict selection criteria	Qualitative (descriptive summary)
Scoping Review	Definition of the research field scope and conceptual framework	Extensive literature (including grey literature)	Qualitative (categorization and thematic analysis)
Rapid Review	Condensed systematic review process within a limited time-frame	Selected literature (usually prioritizing high-quality research)	Qualitative or Quantitative (simplified analysis)

Table 2 Characteristics of Various Literature Reviews (2)

Type	Advantage	Disadvantage	Application
Bibliometric Review	Provides a macro perspective, strong objectivity, and rapid identification of field dynamics	Lacks in-depth interpretation of literature content and relies on data quality and tool selection	Used for scientific policy-making, discipline evaluation, revealing discipline trends, research hotspots, and knowledge networks
Meta-analysis Review	Enhances statistical power and provides objectively universal conclusions	Requires high homogeneity in original research and carries a risk of publication bias	Used for verifying intervention effects and drug efficacy; applicable in fields requiring quantitative conclusions such as medicine and psychology
Systematic Review	Employs rigorous methodology, offers high transparency, and ensures strong evidence credibility	Is time-consuming, labor-intensive, and has high methodological requirements; may be limited by literature accessibility	Used in clinical decision-making and policy formulation; suitable for fields requiring high-quality evidence (such as medicine and education)
Narrative Review	Offers strong flexibility, is easy to understand, and can integrate multiple perspectives	Has high subjectivity, may overlook important literature, and lacks methodological standardization	Provides a field overview and facilitates knowledge dissemination; suitable for preliminary exploration of emerging or interdisciplinary fields
Scoping Review	Adapts flexibly to complex issues and rapidly delineates research boundaries	Does not provide in-depth conclusions and has lower methodological standardization	Used for exploring emerging fields and identifying research gaps; suitable for complex or highly heterogeneous research topics
Rapid Review	Is efficient, low cost, and meets timeliness requirements	Sacrifices comprehensiveness and has limited conclusion reliability	Provides urgent decision support (such as in public health crises and policy-making)

5.3 Comparison of the “Cost-effectiveness” of Various Literature Reviews

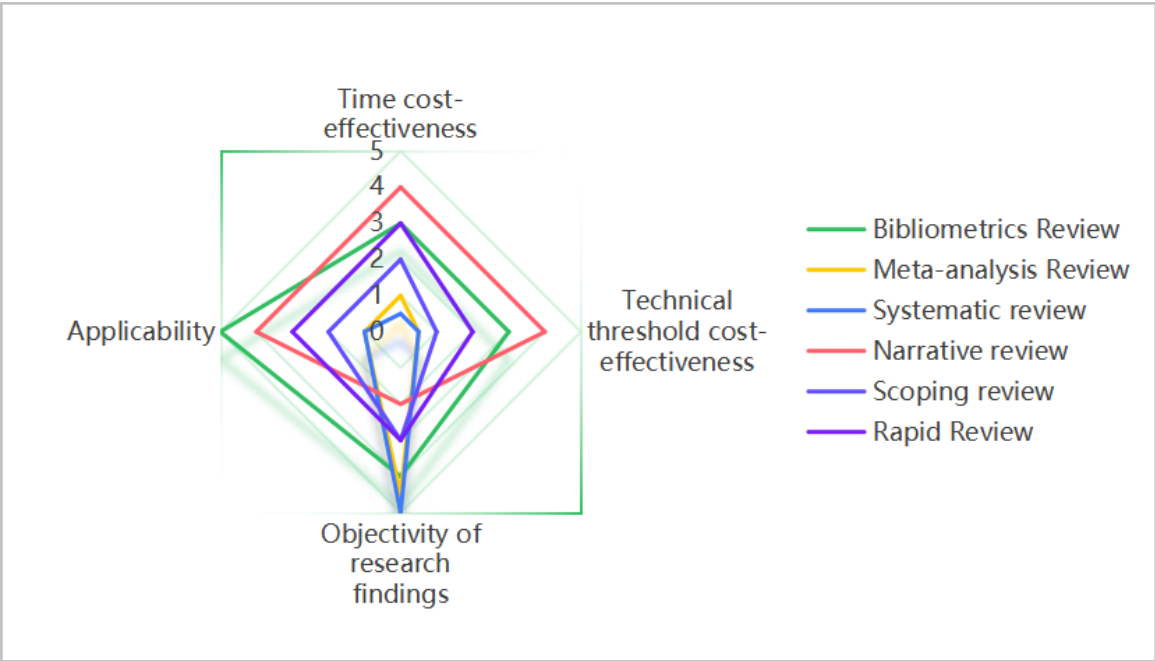
Compared to Systematic/Meta-analysis Review, Scoping Review, and Narrative Review, Bibliometric Review better meets the research training needs of undergraduates due to their “cost-effectiveness” advantage. At the operational level, it relies on standardized databases such as Web of Science and graphical tools like VOSviewer and CiteSpace, enabling data extraction and visualization analysis to be completed within 1-2 weeks. This process does not require mastering the PRISMA framework, R language coding, or complex statistical methods, significantly reducing time costs and technical barriers. In terms of output, data-driven conclusions like high-frequency keyword mapping and burst detection effectively avoid the subjective conjecture risks associated with Narrative Review. Additionally, the intuitive presentation of knowledge maps is more persuasive than the conceptual definitions found in Scoping Review. Crucially, this approach allows for the generation of objective conclusions through observable phenomena such as literature growth trends and author collaboration networks. It avoids the skepticism that arises from the lack of quality assessment in systematic reviews and alleviates the frustration undergraduates may feel due to insufficient domain knowledge. Compared to other types of reviews, it achieves a better balance between fault tolerance, output efficiency, and adherence to academic norms.

Table 3 Cost-Effectiveness Comparison Table for Various Literature Reviews

Types	Time Cost	Technical Thresh- old	Objectivity of Results	Applicability	Overall Cost-effec- tiveness
Bibliometric Review	★★☆☆☆ (Low)	★★☆☆☆ (Low)	★★★★☆ (High)	★★★★★ (Very Strong)	★★★★☆
Meta-analysis Review	★★★★☆ (High)	★★★★★ (Very High)	★★★★☆ (High)	★☆☆☆☆ (Very Weak)	★★☆☆☆
Systematic Re- view	★★★★★ (Very High)	★★★★★ (Very High)	★★★★★ (Very High)	★☆☆☆☆ (Very Weak)	★☆☆☆☆
Narrative Re- view	★☆☆☆☆ (Very Low)	★☆☆☆☆ (Very Low)	★★☆☆☆ (Low)	★★★★☆ (Strong)	★★★★☆
Scoping Review	★★★★☆ (Medium)	★★★★☆ (High)	★★★★☆ (Medium)	★★☆☆☆ (Weak)	★★☆☆☆
Rapid Review	★★☆☆☆ (Low)	★★☆☆☆ (Medium)	★★☆☆☆ (Medium)	★★☆☆☆ (Medium)	★★☆☆☆

Bibliometric Review, with its model of “technology as a tool, data supporting conclusions, and charts packaging results,” perfectly suits the research needs of undergraduates characterized by “short cycles, limited foundational knowledge, and baseline assurance.” It is the optimal solution that balances efficiency and rigor. In contrast, Systematic Review and Meta-analyse Review, which are “high-investment methods,” are more suitable for graduate students or full-time researchers to address deeper issues.

Figure 2 Radar Chart Comparing the Characteristics of Different Types of Literature Reviews



5.4 Comparative Analysis of the “Publishable Potential” of Different Literature Reviews from an Undergraduate Perspective

In undergraduate research, when publishing a paper is set as a goal, it is essential to balance “feasibility” and “academic value.” The type of literature review significantly influences the paper’s innovativeness, methodological rigor, and journal suitability. The core indicators of publishing potential include innovativeness, methodological reliability, and field suitability.

Innovativeness refers to the ability to reveal trends or gaps that have not been sufficiently explored. Methodological reliability involves adherence to the methodological standards of the target journal. Field suitability requires distinguishing the frontier level of the discipline. For instance, emerging fields (such as the ethics of artificial intelligence) are more likely to accept non-traditional review methods because research in these areas may not be as comprehensive.

Table 4 Comparison Table of the “Publishable Potential” of Different Types of Literature Reviews

Type	Publishable Potential	Innovativeness	Technical Threshold	Undergraduate Suitability	Recommended Priority
Bibliometric Review	★★★★☆	Revealing trends and knowledge networks	Low	Very Strong	★★★★★
Meta-analysis Review	★★★★☆	Quantifying the generalisability of findings	Very High	Very Weak	★☆☆☆☆
Systematic Review	★★★★★	High Quality Evidence Integration	Very High	Very Weak	★☆☆☆☆
Narrative Review	★★☆☆☆	Deep domain integration (requires authoritative authors)	Low	Strong	★★☆☆☆
Scoping Review	★★★★☆	Defining emerging field boundaries	Medium High	Medium	★★☆☆☆
Rapid Review	★★☆☆☆	Timeliness Evidence support	Medium	Medium	★★★☆☆

The advantages of publishing a bibliometric review are evident in three aspects: innovative exploration, methodological adaptability, and journal compatibility. Regarding topic selection, bibliometrics can swiftly identify the trajectory of hot topic shifts and core author networks in emerging fields, or uncover new interdisciplinary areas through the association of cross-disciplinary keywords. This aligns with the demand of specialized journals for novel perspectives and meets the thematic preferences of scientometrics columns in comprehensive journals. Methodologically, the reproducible analytical processes and visualized knowledge maps created using standardized tools such as VOSviewer and CiteSpace not only leverage the credibility of these tools to avoid methodological disputes but also transform complex conclusions into intuitive charts, effectively reducing the logical explanatory burden of narrative reviews. Additionally, the corresponding maps are aesthetically pleasing, increasing their likelihood of being favored by reviewers.

Barriers to undergraduate publication in other types of reviews

Table 5 Comparison of Publication Barriers for Literature Reviews Beyond Bibliometrics

Type	Publication Barriers
Systematic/Meta-Analysis	PRISMA/QUOROM statements must be strictly followed. Undergraduate students are likely to face rejection due to procedural flaws, such as search omissions or inadequate bias assessment.
Scoping Review	A clearly defined research scope and a high level of understanding of the field are required. Undergraduate students are often challenged for having an “incomplete conceptual framework.”
Rapid Review	Journals often regard these as having an “insufficient level of evidence,” making them suitable only for non-academic platforms like policy briefs. The publication threshold for policy reports relies on institutions or similar entities, which makes access difficult for undergraduate students.
Narrative Review	Top-tier journals (such as the “Nature Reviews” series) only accept commissioned articles from authoritative scholars. Undergraduate students’ work is often rejected for “lack of depth.”

Overall, Bibliometric Review is the only ‘cost-effective’ option for undergraduate students that simultaneously meets the requirements of low barriers to entry, methodological compliance, and journal acceptance. With precise topic selection, tool use, and journal appropriateness, undergraduates can complete a publication-compliant paper in 6-8 weeks and accumulate their first byline for their academic career. Systematic reviews/meta-analyses have higher theoretical publication potential, but their demanding methodological requirements far exceed the boundaries of undergraduates’ capabilities, leading to frustration and wasted resources.

6.The Practical Approach to Completing and Publishing a Bibliometric Literature Review Paper

The term “complete a bibliometric literature review paper” here refers not only to finishing the paper but also to achieving publication. Therefore, this practical approach must consider a more comprehensive and complex context and trade-offs than those in current research. This study surpasses previous research by innovatively incorporating undergraduate characteristics into the dimensions of consideration and designing a more reliable practical approach to completing a bibliometric literature review paper. Next, this study will demonstrate the entire process of argumentation and writing of a bibliometric literature review. The study is intended to be a literature review on psychological capital, titled “Hot Topics and Frontier Evolution in Psychological Capital Research: A Bibliometric Analysis.” Preparation phase: (1) Assess the researcher’s own research conditions (2) Obtain support from the advisor (3) Demonstrate the feasibility of the research topic. Writing phase: (1) Research methods and data collection (2) Introduction and literature review (3) Main literature and research strengths (4) Hot topics in the research field (5) Frontier evolution (6) Conclusion (7) Abstract and keywords.

6.1 Preparatory stage

The preparatory stage, although it does not involve the writing of the main body of the paper, determines whether a paper has the potential to be published. Established studies have tended to focus on the discourse of writing skills, but have consciously or unconsciously avoided factors other than writing skills. In fact, the preparatory stage sets the stage for whether an article will be published and transformed into an outcome that is recognised by the university’s evaluation system.

6.1.1 Assessment of own research conditions

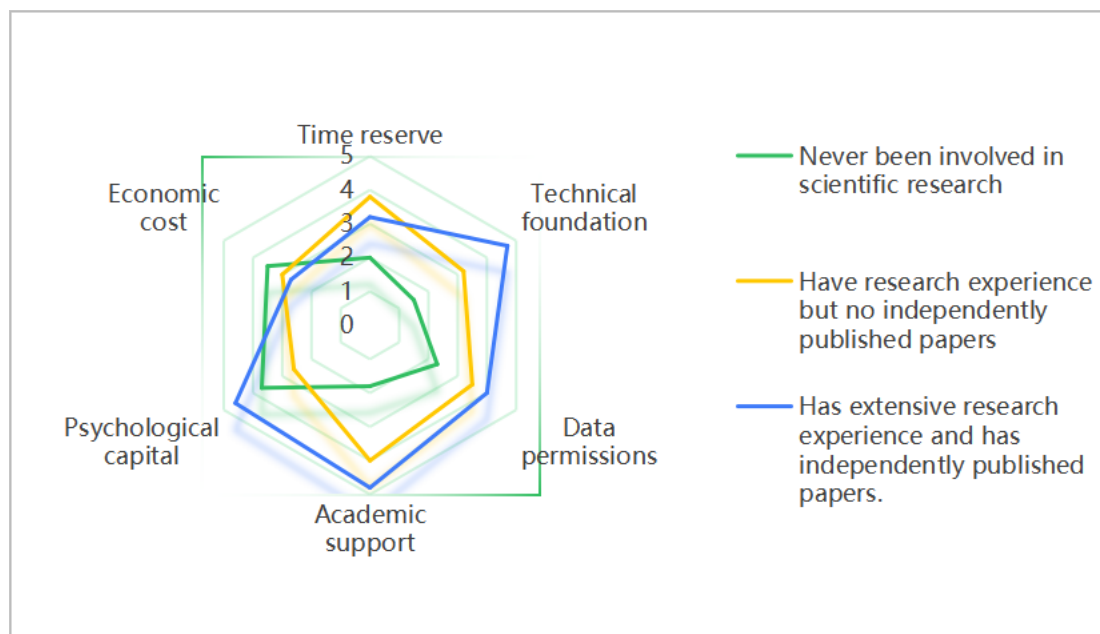
This study innovatively proposes the Undergraduate Research Conditions Self-Assessment Scale (URCSAS framework). The six dimensions of the URCSAS framework, including time reserve, technology base, data authority, academic support, psychological capital, and economic cost, achieve objectivity through quantifiable indicators and multi-source validation mechanisms, and their comprehensiveness is reflected in the logical design of internal and external condition coupling and dynamic system coverage. At the level of objectivity, each dimension is anchored to observable behaviors or resource entities. Time reserve is quantified by the average daily research duration and task completion cycle. Technical foundation is evaluated through proficiency in tool operation, such as the success rate of generating VOSviewer maps, and the reproducibility of experiments. Data access relies on hard indicators like the coverage rate of institutional subscription databases, including the completeness of literature acquisition from WoS/Scopus. Academic support is evidenced by explicit data such as the frequency of mentor guidance and the shared resource directory of the research group. Psychological capital is assessed through a dual-track approach, combining standard scales with behaviors in coping with rejection. Economic cost is objectively reflected in financial data, such as the proportion of literature acquisition costs and expenditures on editing services. These indicators help to some extent in avoiding subjective conjecture. The framework covers three major systems of scientific research activities: intrinsic motivation (psychological capital, technical foundation), external support (academic support, data access), and constraints (time reserves, economic costs). It includes both hard skills like tool operation and resource acquisition, as well as soft skills such as psychological resilience and time management. Furthermore, by examining the aspect of “economic costs,” it highlights the class differences in the allocation of research resources, a social element that is often overlooked.

Table 6 URCSAS framework

Evaluation Dimension	Evaluation Criteria	Self-assessment Score (1-5 points)
Time Reserve	Average daily hours dedicated to research (≥ 3 hours scores 5 points, ≤ 1 hour scores 1 point)	
Technical Foundation	Proficiency in using VOSviewer/CiteSpace; capability in utilizing reference management software (EndNote/Zotero)	
Data Access	Access to institutional databases (coverage of WoS/Scopus); reliability of VPN remote access	
Academic Support	Frequency of mentor guidance (≥ 1 face-to-face meeting per week scores 5 points, no regular guidance scores 1 point); extent of resource sharing within the research group	
Psychological Capital	Ability to handle stress (dealing with rejection/data anomalies); trait of delayed gratification (commitment to 8 weeks of continuous effort)	
Economic Cost	Capacity to afford document delivery/editing services; feasibility of attending academic conferences for feedback	

Although the URCSAS framework strives to ensure objectivity, many indicators remain difficult to quantify. To provide more accurate and visual references, this study involved conducting in-depth interviews with undergraduates who have extensive research experience and have published high-level papers as first authors. By thoroughly analyzing their journeys from initially engaging in research, to participating in project studies, and ultimately to independently publishing papers, three sequential radar charts illustrating undergraduate research conditions are presented for reference.

Figure 3 Radar Chart Comparing the Research Characteristics of Undergraduate Students at Different Stages



Analysis of the interviews and respondents' self-assessment data within the URCSAS framework reveals that the various indicators do not simply increase in line with the enhancement of research capabilities. Instead, they exhibit a complex and intersecting pattern. (For the sake of comparison, no contact with scientific research at all will be recorded as A; experience in scientific research but no independent publication will be recorded as B; rich experience in scientific research and independent publication will be recorded as C.) Analyzing the data reveals that: (1) In the areas of technical foundation, data access, and academic support, A, B, and C show a progressive increase. Specifically, in terms of technical foundation, B and C have engaged in research practice, honing and improving their research skills. Regarding data access, the high subscription

costs of international databases and journals mean that few universities can afford to purchase complete databases and journals. B and C almost inevitably encounter difficulties in obtaining necessary materials through conventional channels during their practice. Through various means, B and C naturally enhance their data access. In terms of academic support, as undergraduates' research capabilities increase (with C even practically reaching the level of a master's student), mentors are very willing to guide them in completing their papers. On one hand, the undergraduate does not require the mentor to spend excessive time on guidance, and on the other hand, the quality of their papers is likely to reach SCIE & SSCI levels, so mentors are very willing to increase their academic support. (2) In terms of psychological capital, A, B, and C experienced fluctuations, first decreasing and then increasing. The analysis suggests that A, having no understanding of academia, harbors unrealistic fantasies about themselves, thus possessing an inflated psychological capital index. B has participated in research projects but, due to the lack of recognized outcomes, their psychological capital has been continuously reduced, reaching a low point. C, with extensive research experience and having independently published papers, sees their psychological capital valuation return to a peak. (3) In terms of time reserves, B has the highest value, with C slightly reduced. This is because B's main task is solely research, lacking the ability to transcend research and achieve research outcomes transformation. Since C's achievements have been recognized by the university evaluation system, they are assigned other tasks related to research but beyond pure research. (4) Regarding economic costs, A, B, and C are generally balanced, with a slight decrease. This is mainly because undergraduates, as they delve deeper into research, tend to proactively purchase research tools.

6.1.2 Acquisition of Mentor Support

In the process of undergraduate students conducting bibliometric review research, the support of their supervisors has an irreplaceable empowering value, which is mainly reflected in the three aspects of academic direction calibration, research credit endorsement, and research funding support.^[12] Firstly, at the level of academic direction calibration, tutors can quickly identify the boundaries of academic value of the selected topic by virtue of their domain knowledge map and research experience. For example, when identifying the research topic of 'psychological capital', tutors can help undergraduates avoid the risk of 'insufficient innovation due to overheating' or 'insufficient data samples due to overcooling' by assessing the maturity of the literature in the field (e.g. trend of average annual publications, stability of the core group of authors), diagnosing the methodological suitability (e.g. completeness of WoS database), and analyzing the potential of disciplinary crossover (e.g. intensity of the correlation with management science and education science). This helps undergraduates to avoid the risk of 'insufficient innovation due to overheated topic' or 'insufficient data sample due to cold field'. This kind of professional judgement can significantly shorten the trial-and-error cycle of students' independent exploration, so that the research design can quickly enter the operable stage. Secondly, in terms of research credit endorsement, the academic status of the supervisor provides multiple guarantees for undergraduate research. When students submit manuscripts as first authors, the role certification of the mentor as corresponding author can effectively enhance the journal editorial board's recognition of the paper's methodological standardisation and the credibility of the conclusions. In particular, bibliometrics research usually involves complex data cleaning processes and tool parameter settings, and the mentor's signature is essentially a guarantee of the compliance of the research process. In addition, mentors can provide students with support for translating their results through academic networks, including recommendations to appropriate journal columns and referrals to reviewers in the field for pre-reviews, etc. These initiatives significantly lower the threshold for undergraduates to independently cope with the academic review system. Finally, at the level of research funding support, the publication of thesis is likely to require page charges, especially the high level foreign SCIE & SSCI journals often charge high page charges ranging from hundreds to thousands of US dollars, and the funding of the supervisor may become the key to whether the thesis can be published or not.

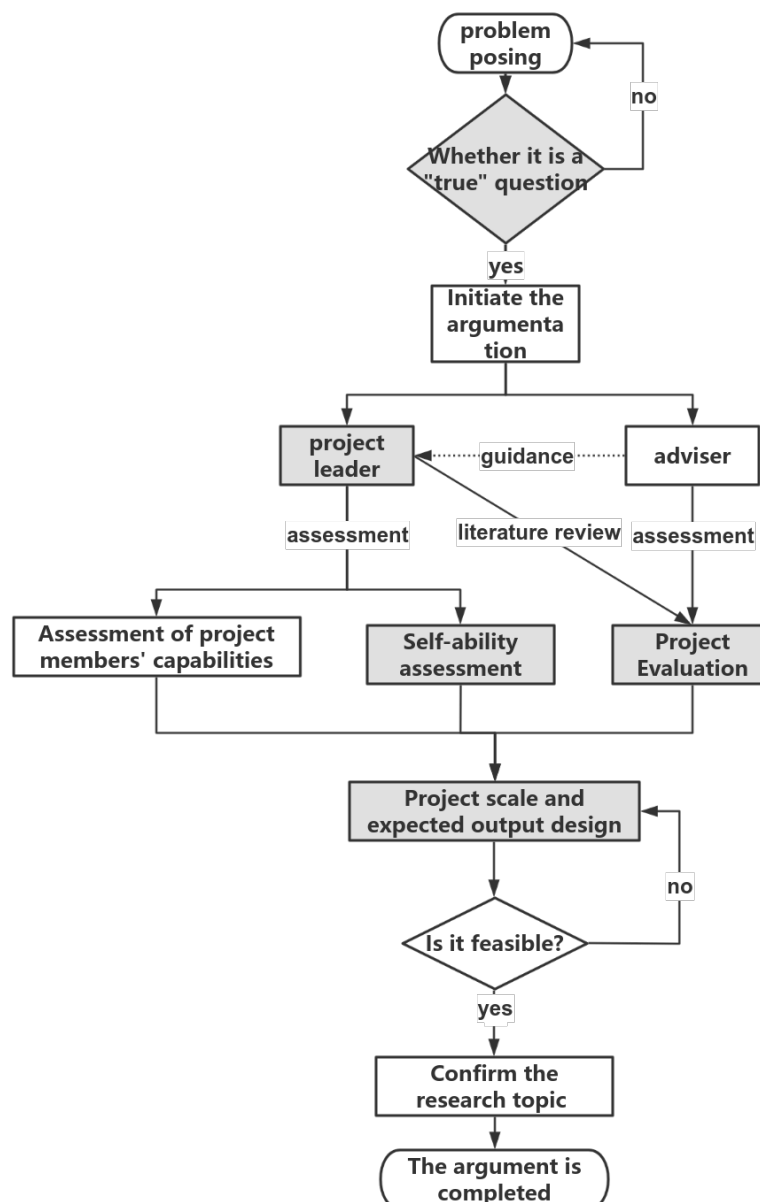
6.1.3 Feasibility Study of Topic Selection

The first stage is problem screening and core value confirmation. The primary task of topic evaluation is to distinguish the authenticity and academic value of the problem. Researchers need to determine whether the topic addresses key issues in the field that have not yet been fully explored.^[13] For instance, in the study of psychological capital, it's essential to assess whether there is a sufficient research gap concerning the "impact of generational differences on psychological capital." By conducting preliminary searches in core databases, researchers can initially ascertain whether the quantity and quality

of literature meet the analytical requirements, while also using knowledge mapping tools to examine the distribution characteristics of existing studies. This phase necessitates the joint involvement of researchers and supervisors: researchers are tasked with verifying the data foundation, while supervisors assess the theoretical value of the topic within an academic framework. Together, they work to eliminate research directions that lack substantive significance or are challenging to analyze quantitatively.

The second phase involves aligning capability assessment with research design. Once the value of the research topic is established, it is essential to systematically evaluate how well the team's capabilities match the research requirements. The project leader must assess the technical skills of team members in areas like literature processing and tool operation, such as their ability to proficiently complete literature screening and data extraction for the psychological capital scale. Researchers also need to self-evaluate their knowledge in applying interdisciplinary methods, such as integrating psychology and management perspectives. During this phase, the advisor focuses on examining how the research topic relates to core disciplinary issues, for example, whether the study of psychological capital aligns with the latest trends in organizational behavior. When capability gaps are identified, the research design should be promptly adjusted. If the team lacks proficiency in complex statistical tools, visual analysis can be prioritized as an alternative; if there is limited theoretical depth, the research scope should be narrowed to specific application scenarios.

Figure 4 Flowchart for Feasibility Demonstration of Selected Topics



The third phase involves research planning and flexible adjustments. The research process is divided into operational, phased tasks based on the team's actual capabilities. For example, the analysis of psychological capital literature can be divided into modules such as basic theoretical review, extraction of intergenerational dimensions, and summarization of intervention strategies. Each phase has clearly defined outcome nodes, such as completing a theoretical framework diagram or generating an intergenerational difference map. The research plan should allow for adjustments: if there is insufficient data on the psychological capital of a certain generational group (such as Generation Z), the focus can shift to the workplace stress dimension, which has more data support. If the progress of visual analysis exceeds expectations, additional extended research, such as cross-national comparisons, can be conducted. This dynamic planning approach ensures the achievement of core objectives while preventing overall research stagnation due to obstacles in a single aspect.

The fourth stage involves comprehensive decision-making and risk control. The final decision must integrate both academic value and practical feasibility. Academically, the advisor evaluates whether the chosen topic can reveal new phenomena or mechanisms based on the field's development patterns, such as whether generational differences in psychological capital reflect the profound impact of social changes. Operationally, the project leader assesses the rationality of the research cycle through time node deduction. If the evaluation is successful, a clear research plan is developed and a team is assembled; if there are significant flaws, the core problem awareness is retained, and the research method is adjusted or the application scenario is changed. For example, if the feasibility of generational research on psychological capital is insufficient, the focus can shift to analyzing the trajectory of psychological capital changes in individuals during career transitions, thereby maintaining core value while reducing implementation difficulty. This decision-making mechanism effectively controls research risks by balancing the pursuit of innovation with realistic conditions.

6.2 writing stage

The complete writing process consists of seven parts: research methods and data collection, introduction and literature review, main literature and research strengths, hot topics in the research field, frontier developments, conclusion, and abstract and keywords.

6.2.1 Description of Research Methods and Data Collection

High-quality data is essential for producing high-quality papers, and the design of scientifically rigorous research methods is crucial for collecting such data. This study recommends sourcing literature from the Web of Science Core Collection (WoSCC), a digital literature resource database that is widely recognized and accepted by scholars for its high quality. This database ensures the quality of the studies included. The primary focus of this study is psychological capital, encompassing its composition, design, and development. To ensure both comprehensive and targeted literature retrieval, this study employs a broad concept approach combined with manual screening. When the keyword "psychological capital" is used, related studies are manually screened. Furthermore, the time span is set from 2021 to 2025 (up to April 29), and the research discipline categories selected are Environmental Sciences, Public Environmental or Occupational Health, Nursing Management, or Psychology Multidisciplinary (the five fields with the largest number of publications).

Relying solely on retrieval and attention techniques may lead to research that appears relevant but is actually unrelated. To minimize the subjectivity of the screening process, this study referred to relevant review studies and established inclusion criteria, as shown in Table 1. These criteria consist of two parts: research content criteria and research quality criteria. The former ensures that the included literature has the basic structure of an academic paper and is closely related to the research topic, while the latter ensures that the included literature contains sound informational elements and has undergone double-blind peer review. Two authors meticulously screened the literature based on these standards. Any discrepancies during the screening process were resolved through discussion or consultation with a third party. Figure 5 is a PRISMA flowchart that visually summarizes the screening process of this study. The initial search yielded 1,891 articles, and 442 articles were selected after meeting the inclusion criteria listed in Table 7.

Table 7 Eligibility Criteria Table

Standard Type	Eligibility Criteria
Research Content Type	The literature must address a clearly defined research question, research methods, and research findings. This study primarily focuses on the core theme of psychological capital, emphasizing its mechanisms and nature rather than just its manifestations.
Research Quality Type	The literature must be at least three pages in length; reports or short papers under three pages are excluded. It should include all essential information elements, such as an abstract, author information, keywords, and a reference list. If these key elements are incomplete, the literature will be excluded. Literature that cannot be fully accessed, due to factors like retraction, will not be included. The literature must have undergone a rigorous and standardized double-blind peer review process. Works not subjected to such a review, like editorials or abstract introductions, will not be included.

Figure 5 PRISMA

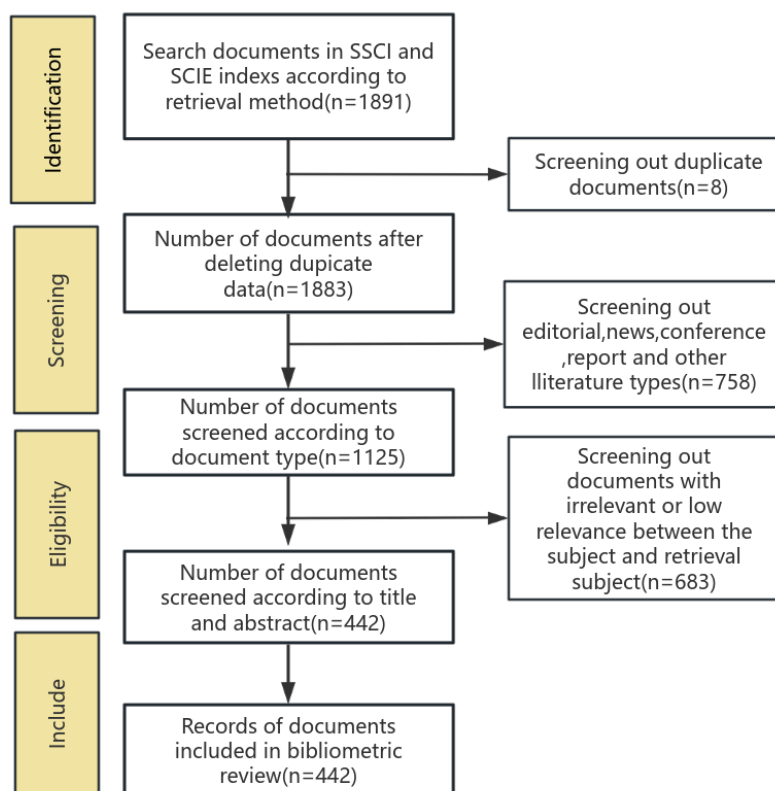


Table 8 Literature Search Table

Category	Specific Standard Requirements
Research database	Web of science core collection
Citation indexes	SSCI&SCIE
Search period	January 2021 to April 2025
Language	“English”
Searching keywords	TS= (“Psychological Capital”)
Subject categories	Environmental sciences or public Environmental or Occupational Health or Nursing Management or Psychology Multidisciplinary
Document types	“Articles”
Data extraction	Export with full records and cites references in plain text format
Sample size	442

After the data is collected, researchers can initially perform a qualitative and informal analysis of the field to grasp the overall landscape of “psychological capital” research. For instance, by examining the five fields with the highest number of publications, researchers can directly identify which disciplines are most popular for “psychological capital” research. By analyzing the author and country data from the sidebar, it is possible to roughly evaluate which countries have the strongest research capabilities. This directly lays the foundation for writing the introduction and literature review in the next stage.

6.2.2 Writing a Literature Review

The purpose of an introduction is to “lead”, yet many researchers new to scientific inquiry often turn the introduction into a replica of the abstract. Undergraduate students should use a “field-problem-method” funnel structure when writing introductions. This study presents the following fictional case analysis.

Case: “Psychological capital, as a key theory for measuring individual positive psychological resources, has been widely used to explain educational issues such as academic persistence and career adaptability since it was proposed by Luthans. Its four dimensions, including self-efficacy and hope, offer quantifiable assessment tools for mental health education in higher education institutions. With the ongoing COVID-19 pandemic and the integration of artificial intelligence technology into campuses, building psychological capital among college students faces new challenges: How can online learning sustain psychological resilience? How does human-machine collaboration influence self-efficacy cognition? Although existing research has accumulated numerous campus intervention cases, there are three main limitations: First, research predominantly focuses on traditional teaching scenarios, with insufficient dynamic monitoring of psychological capital in blended learning environments; second, interdisciplinary research accounts for less than 15%, and the collaborative innovation between education and information technology urgently needs strengthening; third, there is an imbalance in the proportion of regional studies, with sample coverage in central and western universities being less than 30%. Systematically organizing the knowledge map of this field through bibliometric methods can reveal the evolutionary paths of emerging themes such as crisis response and technology integration, providing an evidence base for constructing adaptive psychological support systems.”

Table 9 Table of Common Problems and Strategies for Introduction Writing

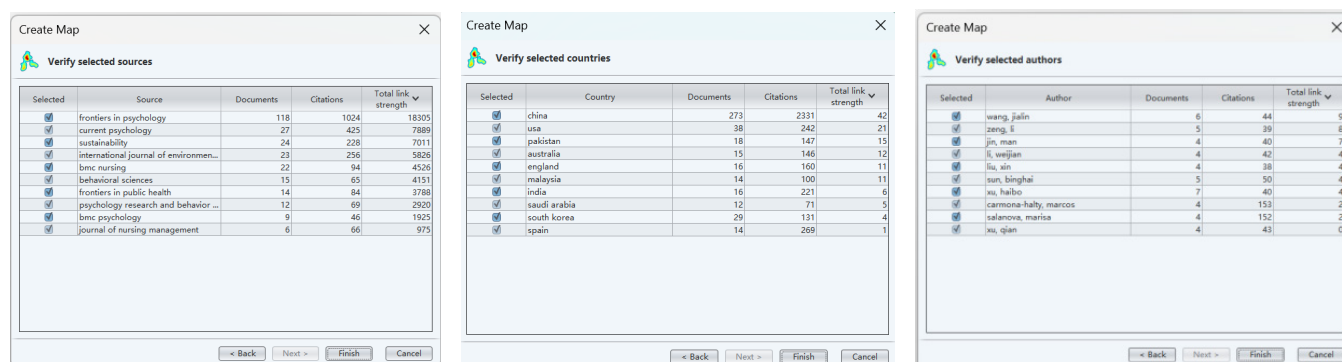
Writing Elements	Common Student Issues	Correction Strategies
Theoretical Tracing	Concepts are mentioned simply, lacking academic context	Original literature should be cited
Real-world Relevance	Theoretical discussions are disconnected from contemporary contexts	Assign tasks to create mind maps linking “Technology/Social Event → Theoretical Extension”
Gap Description	General critique of “insufficient research”	Require the use of a structured expression with “Issue 1:...; Issue 2:...” in three points
Methodological Argumentation	Simple statements of “using XX method”	Train with templates: “By using XX method, both problem A can be addressed and goal B can be achieved”

The literature review in this section is recommended to be a narrative review, which is time-consuming, technically less demanding, and, although not particularly rigorous, fits the undergraduate student’s own research profile and is the most cost-effective. Specifically, you can select highly cited or representative papers from the available data, and summarize and analyse their abstracts, so that you can complete the literature review section most efficiently. Subsequently, three research questions for this study need to be asked after the literature review: 1. What is the distribution of research power in the field of psychological capital research in the past five years? 2. What are the current hot research topics in psychological capital research? 3. What are the cutting-edge trends in psychological capital research?

6.2.3 Main Literature and Research Strength Analysis

The main indicators of research power include the number of publications and journals, core countries and teams. The number of publications and their fluctuations not only reflect the prosperity of a research field, but also reveal the development trend of the field at a macro level. Journals are important vehicles for disseminating the latest research results, and statistical analyses of the literature samples show that most research papers on psychological capital are published in psychology- and medicine-related journals. Among them, *Frontiers in Psychology* contributed a large number of research results, far exceeding other journals. Data from the study showed that China led the way in terms of the number of publications, with a total of 273, more than all other countries combined. It was closely followed by the United States (n=38), South Korea (n=29) and other regions. In terms of the number of citations, China topped the list with 2,331, compared to 242 for the United States and South Korea, respectively. It is worth noting that despite the huge volume of publications by Chinese scholars, their average number of citations did not decrease as a result, but rather exceeded the median (8.345), which suggests that the quality of Chinese scholars' research is somewhat guaranteed. In-depth analyses of psychological capital research were conducted with the aim of identifying representative scholars and core research strengths. Statistical analyses showed that there were 442 papers involving 1570 authors. Based on Price's law (Price, 1963), the minimum number of publications by core authors in the field of psychological capital was calculated to be 1.98 (nmax is the number of publications by the most prolific authors, which was derived from VOSviewer to be nmax=7, corresponding to Professor Xu Haibo). Accordingly, scholars who have published 2 or more research papers on psychological capital can be regarded as core authors, totaling 174. Price points out that the collective effort of research scholars is an important indicator of progress in a field of study. He argues that when an intricate network of collaboration is constructed between authors, groundbreaking research results are more likely to be produced and the focus of the field becomes clearer. Although several unique collaborative teams exist in the field of psychological capital research, close cooperation between these teams has not yet been fully realized. As a result, research in the field has tended to be limited to routine content, focusing on established practice. While this has ensured a degree of depth and quality of research, the lack of communication and collaboration between academic groups has prevented groundbreaking breakthroughs in the field.

Figure 6 VOSviewer-related Data (in terms of psychological capital)



6.2.4 Analysis of Hot Topics in Research Areas

The hot topic analysis of the research area requires the help of VOSviewer software. Based on the keyword co-occurrence network analysis, hot topics are differentiated according to colour blocks. In this process, keywords need to be de-emphasised. Literature keywords often have repetitions with the same meaning but with a difference in singular and plural, which need to be identified and removed manually. In addition, some keywords in the literature are invalid keywords that do not reflect valuable information and interfere with the presentation of the contribution network diagram, which need to be manually debugged continuously. For example, psychological capital as a theme word in the literature keyword frequency is very high, but can not reflect the research needs of the hot topic and interfere with the normal presentation of the hot topic, the keyword should be removed in the previous step of the network diagramming presentation.

Figure 7 Keyword Co-occurrence Graph without Data Optimization

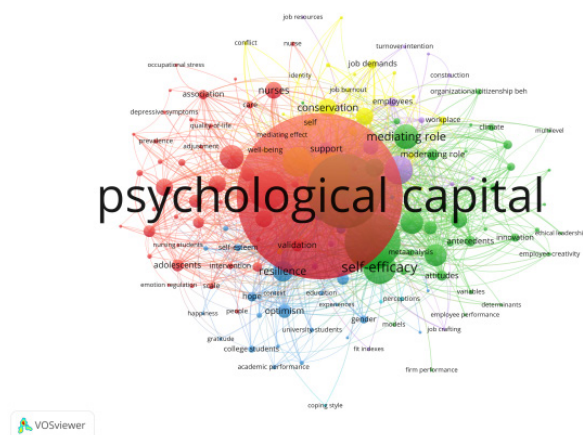
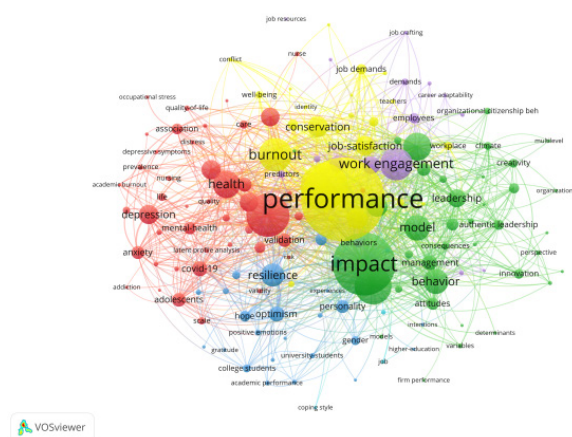


Figure 8 Keyword Co-occurrence Graph with Data Optimization



In the drawing process, a reasonable threshold should be set to ensure that the images are well visualized with keywords and hotpots. If the keyword occurrence threshold is too low, a large number of low-frequency keywords will interfere with the research; if the occurrence threshold is too high, it will result in too few keywords to be aggregated into a complete network. After the mapping is completed, the research hotpot topics are divided according to the colour blocks, while the list describes the frequency of the highest-frequency keywords appearing in each colour block with the frequency of the related keywords, as shown in the table below.

Table 10 Keyword Table

Hot Topics	Occurrences	Total Link Strength
Performance	151	Psychological capital(347) leadership (56) management (25)
Health	47	mental-health(22)anxiety (22)stress (36) burnout (58)
Work engagement	56	job-satisfaction (38)engagement (38)work (36)
Resilience	40	resilience(48)self-efficacy (56)optimism (6) social support (36)
Impact	112	COVID-19 (54) students (46) adolescents (23) attitudes (20)

6.2.5 Analysis of frontier evolution

The analysis of hot topics in the research field requires the help of CiteSpace software. First, duplicate documents are removed using CiteSpace's deduplication function. Then, the classification of publications for each year is obtained, and finally, a chronological map of research topics is created. Similar to the hot topic analysis, CiteSpace also needs to carry out de-weighting and propose invalid keywords to guarantee the high quality of the chronological map. After the mapping is completed, the research hot topics are divided according to the colour blocks, while the list describes the year in which each high-frequency keyword appeared and the frequency of related keywords to segment the evolution logic of the research on the topic of psychological capital, as shown in the figure below.

Figure 9 Timing Diagram of Keywords Without Data Optimization

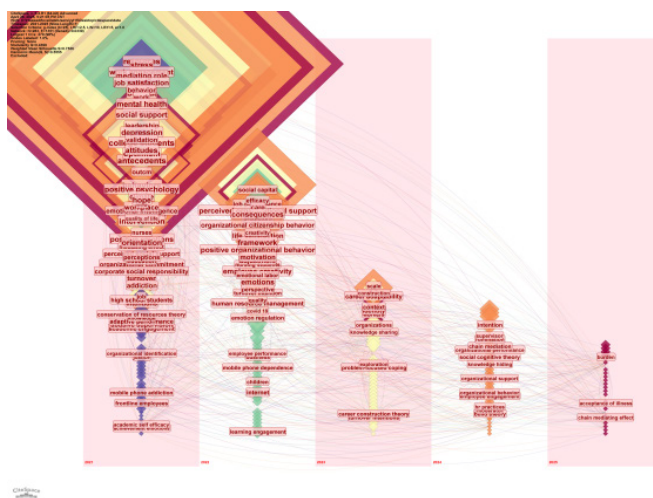
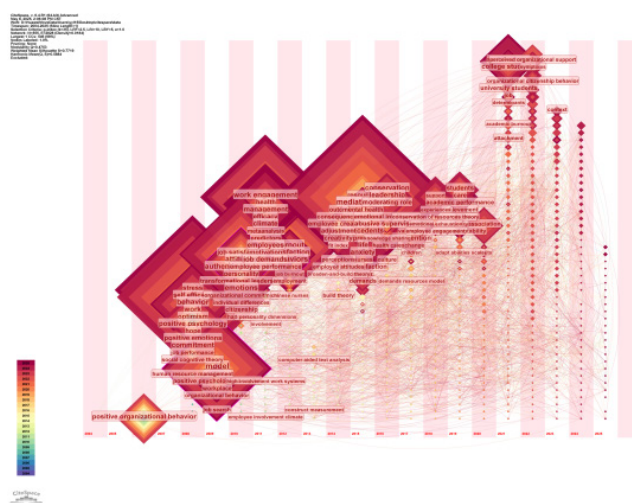


Figure 10 Timing Diagram of Keywords With Data Optimization



6.2.6 Writing the Conclusion

The conclusion is a targeted answer to the research question, which not only summarizes the main findings of the study, but also highlights the contribution of the study to the knowledge of the field. When writing the conclusion, the first task is to clearly list the research data, results, and arguments and answer the research questions posed at the outset point by point. Subsequently, the core significance of the study needs to be clearly stated to ensure that the reader understands the importance and practical value of the study. In addition, the conclusion section should also contain suggestions for future research directions, which not only demonstrates the researcher's forward thinking, but also provides a useful reference for other researchers.

6.2.7 Abstract and Keyword Refinement

The abstract is a highly condensed version of the whole review paper, and usually should contain four parts: background, methods, results, and conclusions. The abstract can be written according to the template, trying to be concise and clear.

Keywords can be selected according to the title.

Table 11 Abstract Writing Template Table

Dimension	Reference Template	Example
Background	(Field Name), as an interdisciplinary field of (Discipline A) and (Discipline B), encounters (specific challenges) within (social background), necessitating the achievement of (research objectives) through (methodology)	Psychological capital, as an interdisciplinary field of positive psychology and organizational behavior, is experiencing multidimensional expansion in both theoretical construction and practical application amidst the backdrop of digital transformation and frequent global crises.
Method	This study employs (specific method), utilizing tools such as (specific software) to systematically analyze (number) articles from the (year) core collection of (database name)	This study employs bibliometric methods, using tools such as CiteSpace and VOSviewer to systematically analyze 442 articles from the Web of Science core collection between 2021 and 2025.
Results	Presented in points according to problem specificity	“(1) Research strength demonstrates regional agglomeration characteristics...” “(2) Hot topics form five core clusters...” “(3) Research paradigms undergo three-stage transitions...”
Conclusion	Through (method), this study reveals (phenomenon), refining the explanatory boundaries of (Theory A) in (Scenario B) and providing (specific solution E) for (Practice Subject C) to address (Problem D)	This study systematically deconstructs the dynamic patterns of knowledge production in the field of psychological capital through bibliometric methods, offering evidence-based support for interdisciplinary theoretical integration and practical innovation.

7. Conclusion

This study constructed an academic training framework with pedagogical appropriateness by systematically analyzing the characteristics of undergraduate research and literature review methodology. It is found that: (1) undergraduates have significant stage characteristics in terms of cognitive load distribution, adaptability of technological tools and internalization of academic norms, and the six-dimensional assessment model of the URCSAS framework can effectively guide self-diagnosis of scientific research conditions; (2) among the seven types of literature reviews, including systematic reviews and meta-analyses, bibliometrics is the optimal choice for undergraduates' scientific research training, by virtue of the support of standardized tools, the output of visual results, and the medium level of rigor; (3) the innovative design of the “literature review” methodology is the best choice for undergraduates' scientific research training; The theoretical contribution of this study is reflected in three aspects: first, it breaks through the single skill training mode of traditional scientific research ability training and constructs a systematic solution; second, it incorporates publication feasibility into the selection criteria of undergraduate scientific research methodology, and proposes a three-dimensional evaluation system of ‘technical threshold - result visibility - journal matching’; third, the developed URCSAS self-assessment scale realizes the core pain points of scientific research through the innovative combination of quantitative indexes and dynamic radar charts; and third, it realizes the core pain points of scientific research focusing, method operation and results transformation. Thirdly, the URCSAS self-assessment scale is developed through the innovative combination of quantitative indexes and dynamic radar diagrams, which achieves the paradigm shift from subjective judgement to objective diagnosis in the assessment of scientific research conditions, and provides a reference and operable training paradigm for the cultivation of undergraduates' scientific research ability.

Funding

1.This research is supported by the project ‘Path of Government Financial Input Restructuring to Promote High Quality Development of Education’（Project No.2025279）of the Canal Cup Extracurricular Academic Science and Technology Fund for College Students of Zhejiang University of Technology and Key Project of Graduate Education Reform at Zhejiang University of Technology: “Research on Optimization Pathways for Integrating Zhejiang’s Red Culture into Graduate

Aesthetic Education in the Context of Comprehensive Ideological and Political Education” (Project No. 2024209)

Conflict of Interests

The author(s) declare(s) that there is no conflict of interest regarding the publication of this paper.

Reference

- [1] Li, L. (2025). From the triple helix to the integration of educational, scientific and technological talents: Higher education and innovative development. *Tsinghua Journal of Education*, 46(01), 30–39.
- [2] Yu, H., & Yan, P. (2024). The academic writing challenges of undergraduate students: An exploratory study at a Sino-Foreign university in China. In *English for academic purposes in the EMI context in Asia: XJTLU Impact* (pp. 15–43). Cham: Springer Nature Switzerland.
- [3] Donthu, N., Kumar, S., Mukherjee, D., et al. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, 133, 285–296.
- [4] Ma, D., & Wang, T. (2023). Avoidance of four misunderstandings of literature review in academic research. *Higher Education Forum*, (06), 106–108.
- [5] Li, Y., & Fu, J. (2024). Critical thinking expression and developmental characteristics in literature reviews: A study based on the social/cognitive genre model. *Journal of Zhengzhou University (Philosophy and Social Sciences Edition)*, 57(05), 124–129.
- [6] Liu, W., Huang, H., Saleem, A., et al. (2022). The effects of university students’ fragmented reading on cognitive development in the new media age: Evidence from Chinese higher education. *PeerJ*, 10, e13861.
- [7] Yaseen, H., Mohammad, A. S., Ashal, N., et al. (2025). The impact of adaptive learning technologies, personalized feedback, and interactive AI tools on student engagement: The moderating role of digital literacy. *Sustainability*, 17(3), 1133.
- [8] Yuan, R., Yang, M., & Mak, P. (2022). Undergraduates’ motivations to engage in extracurricular research: Evidence from Hong Kong. *Innovations in Education and Teaching International*, 59(6), 679–689.
- [9] Moral-Muñoz, J. A., Herrera-Viedma, E., Santisteban-Espejo, A., et al. (2020). Software tools for conducting bibliometric analysis in science: An up-to-date review. *Profesional de la Información*, 29(1).
- [10] Paul, J., & Barari, M. (2022). Meta-analysis and traditional systematic literature reviews—What, why, when, where, and how? *Psychology & Marketing*, 39(6), 1099–1115.
- [11] Brignardello-Petersen, R., Santesso, N., & Guyatt, G. H. (2025). Systematic reviews of the literature: An introduction to current methods. *American Journal of Epidemiology*, 194(2), 536–542.
- [12] Ren, J., & Li, X. (2024). Mentor support and postgraduate research ability: The role of research self-efficacy and academic atmosphere. *Asia Pacific Journal of Education*, 1–15.
- [13] Adhikari, G. R. (2020). Strategies for selecting a research topic. *Mining Engineers’ Journal*, 22(1), 27–31.