Journal of Infrastructure, Policy and Development 2024, 8(8), 4489.
https://doi.org/10.24294/jipd.v8i8.4489

Article

Comparative analysis of research trends in teaching quality evaluation: A visual exploration using CiteSpace knowledge mapping in the context of the COVID-19 pandemic

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CITATION

Zheng H, Wang Y, Ding L, Mu H. (2024). Comparative analysis of research trends in teaching quality evaluation: A visual exploration using CiteSpace knowledge mapping in the context of the COVID-19 pandemic. Journal of Infrastructure, Policy and Development. 8(8): 4489. https://doi.org/10.24294/jipd.v8i8.4489

ARTICLE INFO

Received: 30 January 2024
Accepted: 8 April 2024
Available online: 8 August 2024

Abstract: With the outbreak of the COVID-19 pandemic in 2019, educational activities have faced significant disruptions, leading to a widespread adoption of online teaching and a transformation in the evaluation of teaching quality. Using CiteSpace visualization software, the study examines 1485 papers from the Chinese database of China Knowledge Network and 1656 papers from the English database of Web of Science (WoS) spanning the period from January 2013 to June 2023 as research samples. The findings reveal heightened activity in China and other countries research on teaching quality evaluation, moreover, research in both contexts predominantly comprises independent studies, supplemented by collaborative efforts. Notably, there is an increased focus on the exploration of online teaching quality evaluation, specifically delving into methodologies and systems. The emphasis has shifted towards students' learning initiatives and a comprehensive evaluation of teachers' work before, during and after class. While research in other countries has also identified new hotspots related to online teaching, the number of studies is comparatively limited. The study proposes the imperative need to update the evaluation criteria for online teaching and enhance the infrastructure of online teaching platforms. Additionally, it advocates for reforms in the evaluation systems of educational institutions and innovations of teachers' instructional methods.

Keywords: teaching quality evaluation; COVID-19 pandemic; CiteSpace knowledge mapping; online teaching

1. Introduction

Since the outbreak of COVID-19 pandemic in 2019, the global higher education sector has encountered unprecedented challenges (KHAN, 2021; QADIR, 2021). Offline teaching and learning activities have been significantly impacted, leading to the closure of numerous universities worldwide. In the United States alone, as of 14 July 2020, 107 universities have declared permanent closures, affecting 16,339 students who were compelled to navigate disruptions in offline teaching activities. At the same time, countries such as Italy, the United Kingdom (UK), Germany, and other countries have also implemented measures, including the closure of certain schools, in favour of conducting "cloud education" through activities like webinars (CGTN, 2020).

This global education crisis has exerted immense pressure, prompting a reassessment of teaching methods and approaches. Within this framework, the evaluation of teaching quality has emerged as a highly significant topic (Zhang et al.,

2022). Modifications in evaluation methods and approaches are shaped by various factors, such as the demographics of the student population and the employed teaching methodologies. In response to evolving real-world demands, educational institutions have adjusted and innovated their evaluation methods to align with diverse modes of teaching and learning activities (Zhai, 2018). The ensuing examples highlight some of the changes that have unfolded in the teaching and learning processes.

The conventional methods for evaluating teaching quality face challenges in meeting the requirements of online teaching assessment, necessitating the emergence of new evaluation methods and models. Consequently, there has been a shift in the focus of research on teaching quality evaluation. In this study, we employ visual knowledge mapping to compare and analyze literature pertaining to teaching quality evaluation over the past decade, both in China and the other countries. Through this analysis, we aim to identify the hotspots and trends in research within the context of the pandemic, offering theoretical insights for the design of evaluation indices for blended and online teaching in universities. At the same time, this study intends to provide strategic guidance for developing assessment programs for teachers engaged in flipped classrooms and other teaching activities, thereby fostering the continual enhancement of educational quality.

Existing research on teaching quality evaluation has generated substantial results and a more comprehensive research perspective. However, the landscape of teaching methods has undergone significant changes in the context of the pandemic, with a widespread adoption of online teaching (Deng et al., 2021; Ortiz-López et al., 2021). To align with the evolving requirements of teaching quality evaluation, the research hotspots in this field have shifted. Previous studies have identified that, in the realm of online teaching, there is a lack of new evaluation standards, outdated evaluation concepts, and a need for improvement in the performance evaluation framework (Laupper et al., 2020; Xiao, 2022). To address these issues, researchers have employed various scientific and rigorous approaches and methods, such as random forest, convolutional neural network (Cao and Gao, 2022; Lan and Huang, 2020), hierarchical analysis (Li et al., 2019; Zeng et al., 2022), and fuzzy comprehensive evaluation methods (Tang et al., 2020). These efforts aim to develop evaluation criteria and framework that are adaptable to online teaching, meeting the real-world demand of teaching quality evaluation.

Utilizing the CiteSpace visualization software, this study compared and analyzed relevant literature from China National Knowledge Infrastructure (CNKI) database and WoS database over the past 10 years (January 2013–June 2023). The aim was to delineate the research characteristics and cutting-edge trends in China and the other countries teaching quality evaluation research. Both similarities and distinct differences were observed in the characteristics.

The similarities include a lack of teamwork and collaboration between research teams. Additionally, both have shifted their focus towards online teaching quality evaluation, forming a common research trend. However, the differences are notable. Research in China emphasis on the construction of evaluation frameworks and the selection of evaluation standards, while research in other countries concentrates on measurement and the enhancement of evaluation effectiveness. Moreover, research in China prioritizes theoretical methods, whereas research in other countries gives more

weight to case analysis.

Through this comparative analysis, the study unveils the strengths and weakness of existing research methods, offering directional reference and informational support for the subsequent research and the practical application of teaching quality evaluation.

2. Study design

2.1. Research tools

CiteSpace is designed to pinpoint and visually represent research areas for detailed literature analysis (Chen et al., 2015). In this study, CiteSpace 6.1.R6 is used to visualize and analyze the authors and keywords of research in China and other countries respectively, yielding various types of maps. Author collaboration mapping provides insights into the cooperation among researchers and the primary research directions of key contributors. Analyzing the keyword correlation mapping allows us to comprehend the research hotspots and trends within the field.

2.2. Data sources

Utilizing the China Knowledge Network Database (CNKI) and Web of Science Core Collection, we conducted a comprehensive search within title, abstract, and keywords (TAK) fields. The search terms used were: “teaching quality evaluation” or “teachers’ teaching quality evaluation” or “internal teaching quality evaluation” or (“higher education” and “teaching quality evaluation”) or “teaching evaluation”. The search was restricted to the time range of January 2013–June 2023, resulting in the retrieval of 1485 articles in Chinese. Additionally, within the same time frame, 1656 articles in English were identified. The literature screening process is illustrated in **Figure 1**.

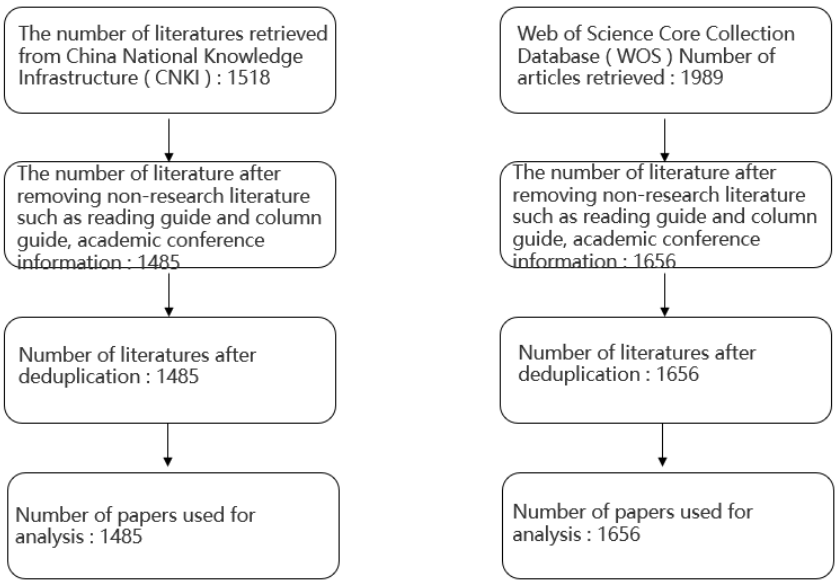

Figure 1. Literature screening flowchart.

3. Findings and analysis

3.1. Annual literature publication analysis

The annual total number of publications in core journals, both in China and other countries, effectively mirrors the overall landscape of the teaching quality evaluation research field. It provides insights into the historical development of this research domain and the level of activity during different periods over time. As depicted in **Figure 2**, from 2013 to 2020, the number of articles published in China literature on teaching quality evaluation exhibited a fluctuating downward trend, yet consistently remained above 100 per year. However, from 2020 to 2022, there was a notable upswing. This increase coincides with the widespread promotion of online teaching during the pandemic, reflecting a heightened focus on teaching quality evaluation due to changes in teaching modes.

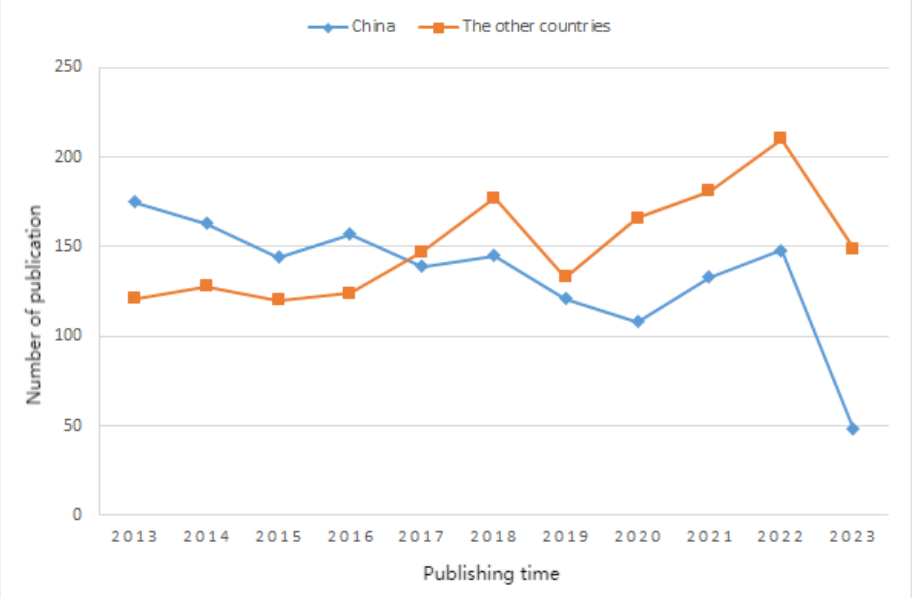

Figure 2. Annual number of publications on research (2013–2023).

On the other hand, the annual publication trend of teaching quality evaluation research literature in other countries demonstrated a generally stable upward trajectory, with a sudden decrease in published literature observed in 2022. In comparison, before 2019, the number of articles published in the field of teaching quality evaluation research, both in China and other countries, showed a trend of smooth fluctuations. However, post-2019, there was a significant fluctuation. The changing trend in the number of published articles indicates a substantial impact from the COVID-19 pandemic and the increased maturity of network technology. This has led to the widespread implementation of online teaching activities, prompting corresponding adjustments in teaching quality evaluation methods (Xie et al., 2020).

3.2. Comparative analysis of author collaboration networks

Figure 3 illustrates map of authors of published articles in China on teaching quality evaluation research over the past decade, obtained through the analysis of sample literature using CiteSpace. The author collaboration network suggests that

these authors share similar views or have a certain degree of research convergence through collaborating specific studies. The mapping reveals that there are 305 author nodes (*N*) with 58 connections. While some author nodes are closely connected, indicating a cooperative research relationship, a significant number of nodes remain unconnected. Overall, the research landscape in China in this field exhibits a predominant trend of independent research, occasionally complemented by collaborative efforts. It is evident that research in China on teaching quality evaluation has given rise to a few research collaboration teams, and certain individual scholars have established stable collaborative relationships. Nevertheless, the overarching characteristic is that China research is still primarily characterized by independent efforts with collaboration playing a supplementary role.

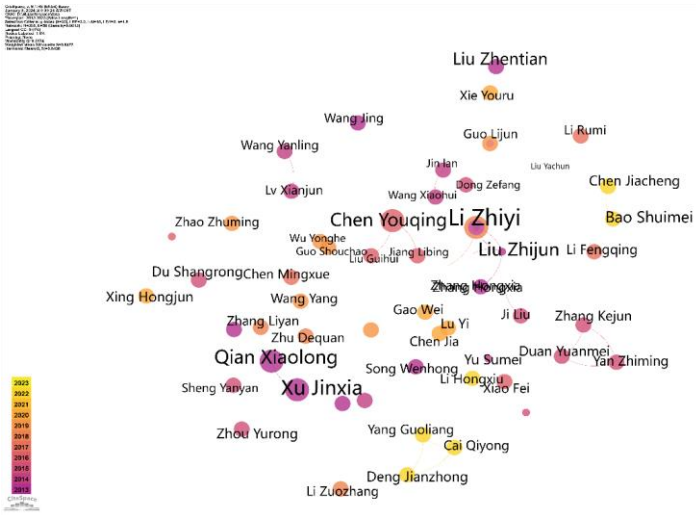

Figure 3. Map of authors of published articles in China.

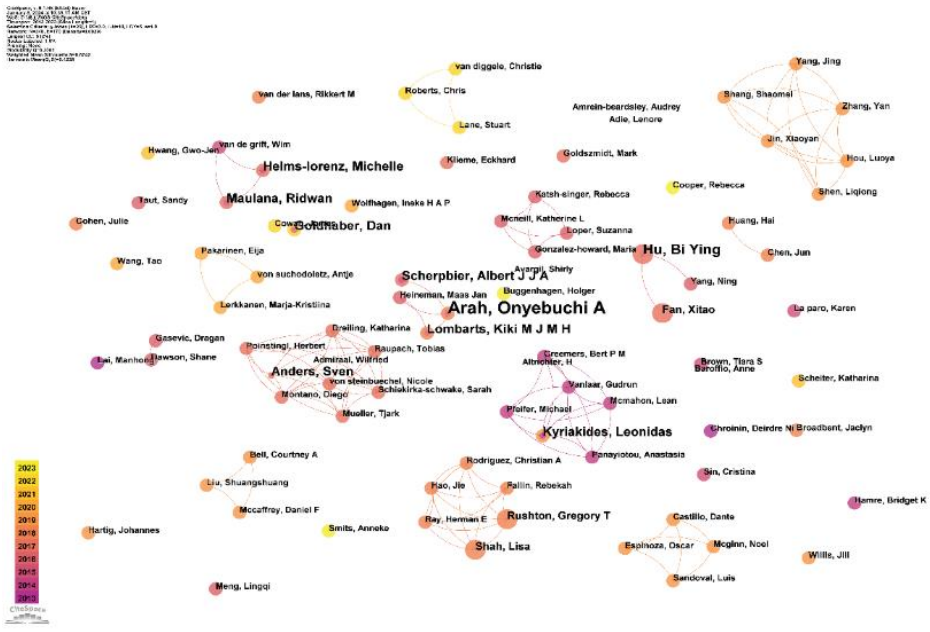

Figure 4. Map of authors in other-countries.

Figure 4 illustrates the map of authors in other- countries on teaching quality evaluation over the past decade, derived from the analysis of sample literature using

CiteSpace. The map reveals that there are 340 author nodes (*N*) with 170 connections. Overall, the research in other countries field predominantly exhibits independent research.

3.3. Comparative analysis of keyword co-occurrence mapping

Keyword co-occurrence analysis primarily examines the frequency and link strength between keywords to reveal the hotspots and frontiers of research. **Figure 5** shows the keyword co-occurrence map of China research, providing a comprehensive overview of the keywords in the field of teaching quality evaluation over the past decade. The map, centered around the theme "teaching quality evaluation", features 388 keywords represented by nodes (*N*) and 761 links (*E*), connecting these keywords. The connections highlight the interrelation among various research hotspots. Larger font sizes of node keywords indicate higher frequency and stronger intermediary centrality, while thicker lines signify stronger associations between keywords.

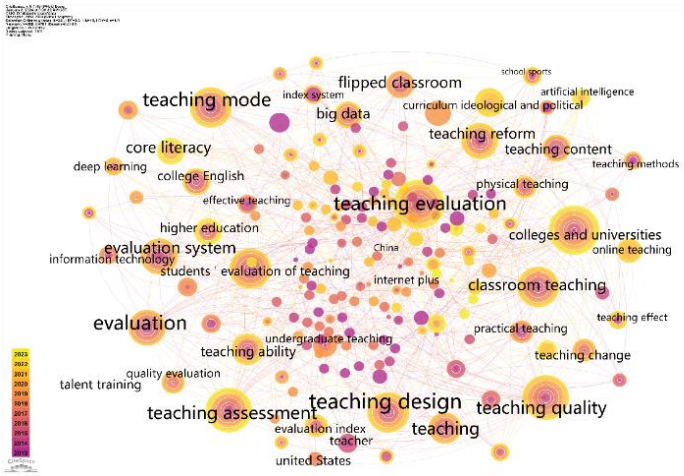

Figure 5. Keyword co-occurrence map of research in China.

The top two keywords, "teaching evaluation" and "teaching quality", exhibit the highest frequencies. Other keywords with intermediary centrality greater than 0.01 include "university", "classroom teaching", "teaching mode", "evaluation", "instructional design", "big data", "artificial intelligence ", and more. **Table 1** displays high-frequency keywords in the teaching quality evaluation research field, revealing research hotspots and trends. The top ten keywords by frequency are "teaching evaluation" (206), "teaching quality" (70), "teaching assessment" (55), "universities" (46), "classroom teaching" (43), "teaching mode" (39), "evaluation "(35), "student evaluation" (32), "instructional design" (32), "evaluation system" (31). Noteworthy is the appearance of "big data" in 2014 and "artificial intelligence" in 2018 among high frequency keywords, indicating a shift in research methodologies aligned with technological advancements and changes in teaching modes.

Traditional teaching quality evaluation encompasses various components, primarily comprising student and teacher evaluations. The evaluation subjects involve administrators, supervisors, students, and teachers, and the evaluation methods can be categorized into outcome evaluation and process evaluation, along with quantitative and qualitative assessment techniques (Liu et al., 2022; Wang et al., 2023). Teachers'

evaluations prioritize the utilization of teaching resources and proficiency in information technology. In contrast, students' evaluations place greater emphasis on interactive communication and technical skills. This reflects the ability of students to engage with teachers through online teaching platforms and their proficiency in completing online assessments as required.

Table 1. Keywords of research in China (only the top 20 keywords).

Number	Keywords	Frequency	First appearance	Centrality
1	Teaching evaluation	206	2013	0.6
2	Teaching quality	70	2013	0.1
3	Teaching evaluation	55	2013	0.06
4	Colleges and universities	46	2013	0.1
5	Classroom teaching	43	2013	0.07
6	Teaching mode	39	2013	0.06
7	Evaluation	35	2013	0.08
8	Students 'evaluation of teaching	33	2013	0.03
9	Teaching design	32	2013	0.05
10	Evaluation system	31	2013	0.04
11	Core literacy	28	2018	0.05
12	Teaching	24	2014	0.05
13	Flipped classroom	23	2014	0.05
14	Curriculum ideological and political	23	2018	0.03
15	Talent training	21	2014	0.02
16	Big data	18	2014	0.02
17	Artificial intelligence	18	2018	0.03
18	Physical education teaching	17	2014	0.03
19	Higher education	17	2015	0.02
20	College English	17	2014	0.01

Figure 6 illustrates the keyword co-occurrence map of research in other countries. The total number of keywords is 409 (node *N*), with 3203 connections (line *E*). The mapping is centered around the research theme of "teaching quality evaluation", and keywords with a mediational centrality of more than 0.01 include terms such as "quality ", "education", "higher education", "students", and "teachers". The top ten keywords, arranged by frequency (**Table 2**), are "quality" (307), "education" (235), "higher education "(193), "students" (172), "teachers" (114), "perceptions "(113), "performance" (112), "knowledge" (105), "impact "(102), and "achievement" (88).

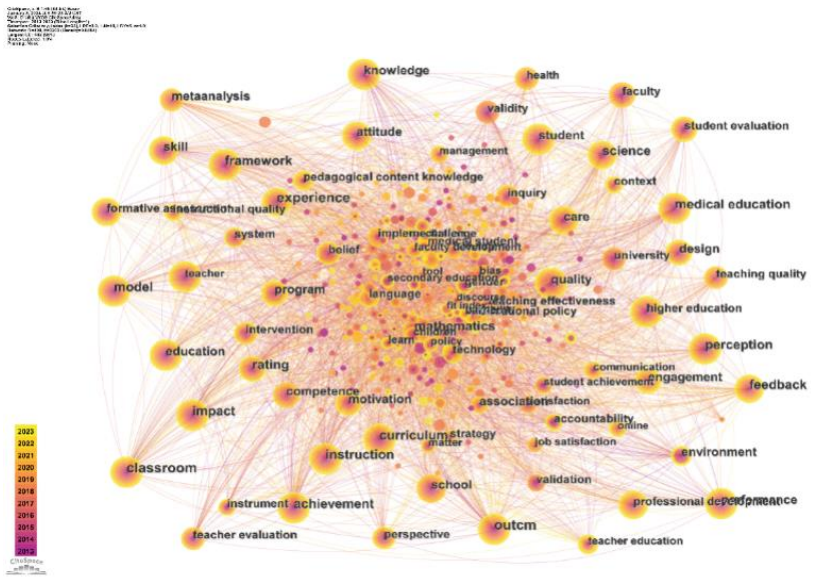

Figure 6. Keyword co-occurrence map of research in other countries.

Table 2. Keywords of research in other countries.

Number	Keywords	Frequency	First appearance	Centrality
1	Quality	307	2013	0.07
2	Education	235	2013	0.03
3	Higher education	193	2013	0.03
4	Students	172	2013	0.04
5	Teachers	114	2013	0.02
6	Perceptions	113	2013	0.05
7	Performance	112	2013	0.05
8	Knowledge	105	2013	0.04
9	Impact	102	2013	0.07
10	Achievement	88	2013	0.1
11	Instruction	81	2013	0.03
12	Professional development	78	2015	0.01
13	Skills	76	2013	0.05
14	Medical education	69	2013	0.07
15	Feedback	66	2013	0.07
16	Outcome	64	2013	0.08
17	Classroom	63	2013	0.06
18	Validity	61	2013	0.04
19	Ratings	59	2013	0.04
20	Teaching quality	58	2015	0.03

3.4. Comparative analysis of keyword cluster mapping

High-frequency keywords are frequently employed to pinpoint hot topics and discern cutting-edge evolutionary trends within a research area. In **Figure 7** the keyword cluster mapping of research in China is presented. The keyword clustering analysis was conducted using CiteSpace software, with the pruning algorithm

employing Pathfinder-Pruning for network simplification. The clustering mapping was achieved through the application of the log-likelihood-ratio (LLR) algorithm. The clustering module value (*Q*-value) stands at 0.5174, surpassing 0.3, signifying a significant clustering effect. Furthermore, the clustering average profile value (*S*-value) is 0.8462, exceeding 0.7, rendering the clustering result credible.

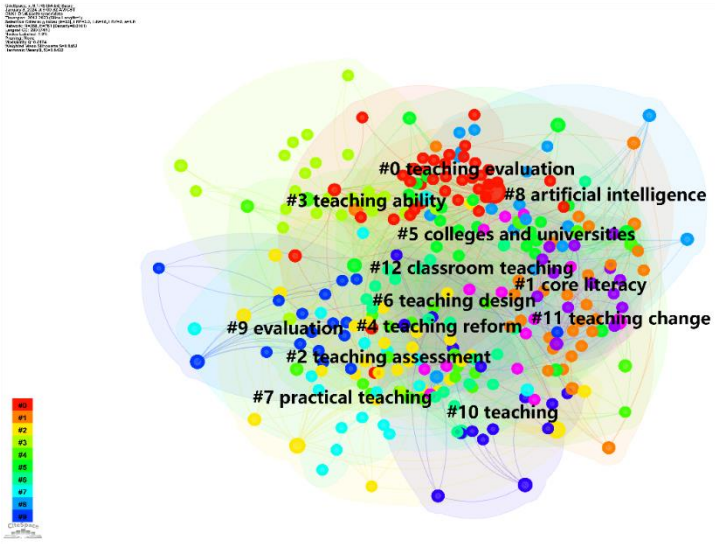

Figure 7. Clustering mapping of keywords for research in China.

Over the past decade, China teaching quality evaluation research can be categorized into 13 clusters based on keywords. Cluster #11, labeled as "teaching change", reflects the research focus on the evolving landscape of teaching methods. Examining specific high-frequency keywords within this cluster reveals a keen interest in the adjustments and transformations occurring in teaching quality methods, particularly in response to the widespread adoption of online teaching approaches (Li and Zhang, 2022). The construction of an evaluation system tailored for online teaching has emerged as a new area of interest in teaching evaluation. This increasing refinement of online teaching platforms and tools has accentuated the significance of "big data" in teaching quality evaluation (Gu, 2022; Shang and Du, 2023; Yang, 2022).

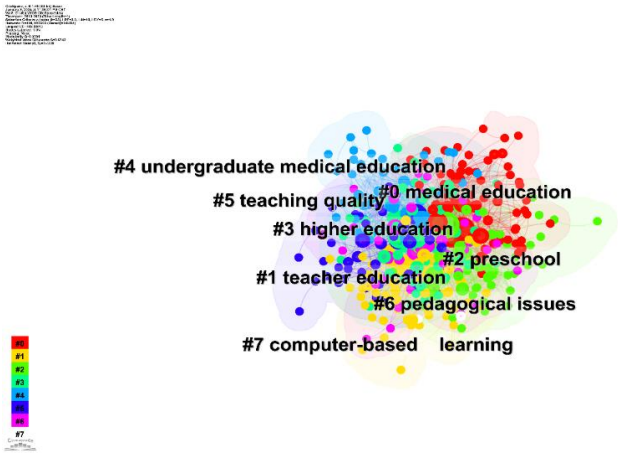

Figure 8. Clustering map of keywords for research in other countries.

Figure 8 displays clustering map of keywords for research in other countries, revealing 8 distinct clusters based on keywords. While the majority of clusters continue to emphasize traditional teaching quality evaluation, such as #5 "teaching quality" and #1 "teacher education", There is also notable attention to cluster #7 "computer-based learning". This cluster signifies the intersection of online learning and face-to-face teaching, indicating that the hotspots of research in other countries are expanding to include online teaching quality evaluation.

3.5. Comparative analysis of keyword clustering timeline mapping

Figure 9 illustrates the keyword timeline map of research in China on teaching quality evaluation. As depicted in **Figure 9**, the keywords prevalent in China teaching quality evaluation research from 2013 to 2019 primarily depict the focal points and evaluation methods of traditional teaching quality evaluation research. These methods emphasize various disciplines and specialties, constructing evaluation systems based on offline classrooms, with a focus on assessing both students and teachers (Dzakadzie and Quansah, 2023; Xue et al., 2021).

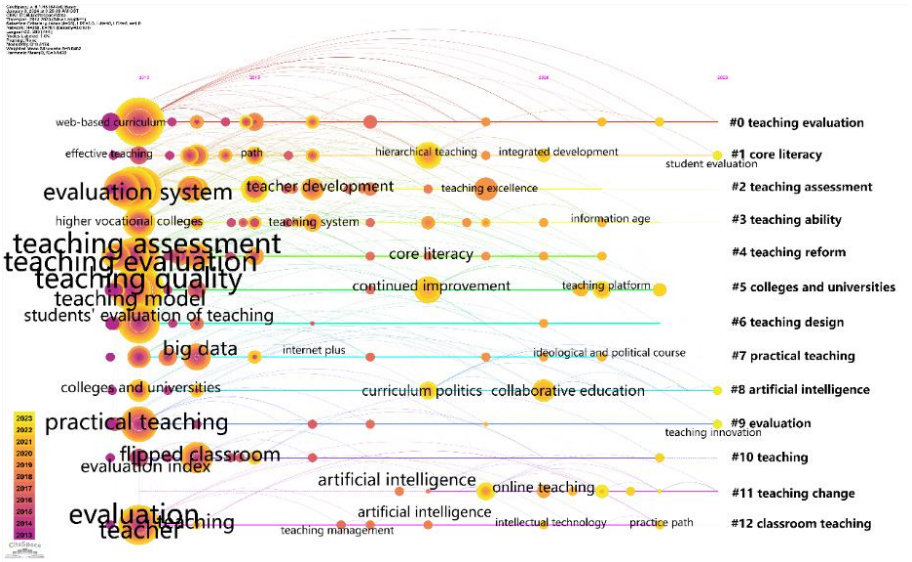

Figure 9. Keyword timeline map of research in China.

In the period of 2020–2023, new keywords such as "online teaching", "teaching platform", and "intelligent technology" have emerged. It is evident that the surge in online teaching since the outbreak of the COVID-19 pandemic in 2019 has brought about a transformation in teaching quality evaluation. The evaluation system has become more sophisticated, witnessing the rise of a new method for teaching quality evaluation, leveraging big data and the Internet (Zhou and Lin, 2021).

Compared to the traditional evaluation method system, online teaching quality evaluation is centered about the online classroom. Simultaneously, there is increased attention on information platforms and learning platforms. Evaluation of student performance now places greater emphasis on students' learning initiative, and the evaluation criteria for teachers cover a broader range, including pre-class, in-class, and post-class activities, making it more diverse and comprehensive (Shi et al., 2022).

Figure 10 illustrates the keyword timeline map of research in other countries on

teaching quality evaluation. The keywords present in teaching quality evaluation research in other countries from 2013 to 2019 are indicative of the traditional teaching quality evaluation model and methods. Notably, keywords such as "online teaching" emerge in the years 2020–2023.

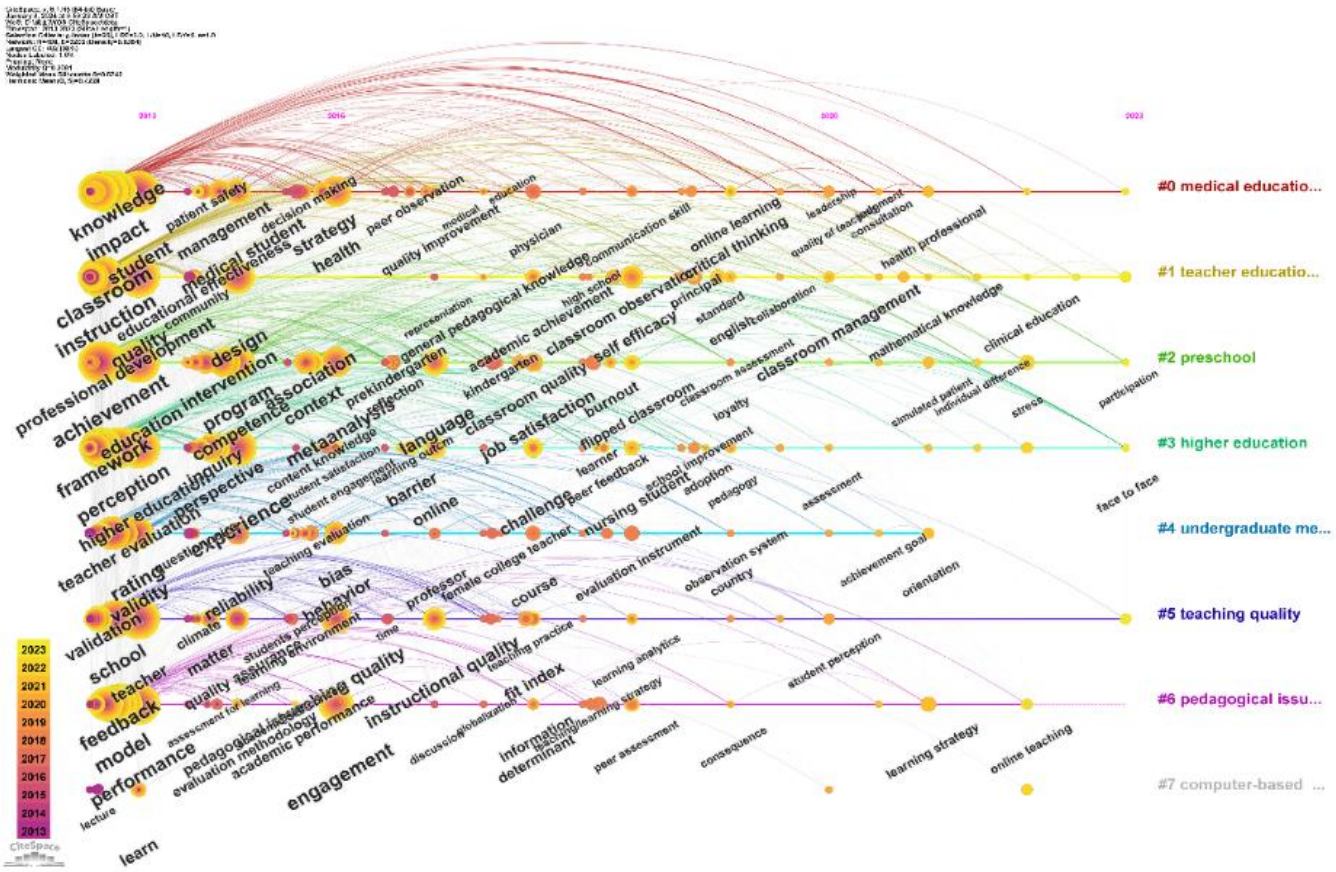

Figure 10. Keyword timeline map of research in other countries.

3.6. Comparative analysis of keyword emergence mapping

Table 3 presents the keyword burst map of research in China. It is evident that "teaching change", "online teaching", and "artificial intelligence" have emerged as hotspots for researchers between 2019 and 2023. The emergence of these keywords aligns with the onset of the COVID-19 at the end of 2019.

Table 4 presents the keyword burst map of research in other countries. Compared to **Table 3**, the keywords appearing in **Table 4** do not clearly reflect the changes in teaching methods brought about by the onset of the COVID-19.

Table 3. Keyword burst map of research in China.

Top 18 keywords with the strongest citation bursts					
Keywords	**Year**	**Strength**	**Begin**	**End**	**2013–2023**
Teacher	2013	3.48	2013	2015	▬▬▬▬▬▬▬▬▬▬
Index system	2013	3.47	2013	2014	▬▬▬▬▬▬▬▬▬▬
Higher vocational colleges	2013	3.38	2013	2016	▬▬▬▬▬▬▬▬▬▬
United States	2014	3.22	2014	2017	▬▬▬▬▬▬▬▬▬▬

Table 3. (*Continued*).

Top 18 keywords with the strongest citation bursts					
Keywords	**Year**	**Strength**	**Begin**	**End**	**2013–2023**
College English	2014	2.81	2014	2015	
Flipped classroom	2014	3.62	2015	2017	
Big data	2014	2.64	2016	2019	
Quality evaluation	2016	2.52	2016	2019	
United Kingdom	2017	2.52	2017	2018	
Core literacy	2018	5.77	2018	2023	
Talent training	2015	3.97	2018	2019	
Teaching reform	2013	3.74	2018	2019	
Continuous improvement	2018	2.6	2018	2020	
Teaching change	2019	2.7	2019	2023	
Online teaching	2020	6.14	2020	2021	
Artificial intelligence	2018	6.14	2020	2023	
Curriculum ideological and political	2018	8.85	2021	2023	
Ideological and political course	2021	3.73	2021	2023	

Table 4. Keyword burst map of research in other countries.

Top 25 keywords with the strongest citation bursts					
Keywords	**Year**	**Strength**	**Begin**	**End**	**2013–2023**
Environment	2013	3.73	2013	2017	
School effectiveness	2013	3.44	2013	2014	
Program	2014	3.16	2014	2015	
Experience	2014	2.9	2014	2015	
Student evaluation	2014	2.78	2014	2017	
Residents	2015	3.81	2015	2016	
Design	2014	3.11	2015	2016	
Views	2017	3.49	2017	2018	
Physicians	2017	2.99	2017	2018	
Reliability	2014	6.73	2018	2020	
Courses	2018	3.01	2018	2019	
Classroom observation	2018	2.93	2018	2019	
Validity	2013	2.85	2018	2019	
Student evaluations of teaching	2018	2.76	2018	2020	
Learning analytics	2018	2.76	2018	2020	
Standards	2019	2.82	2019	2023	
Metaanalysis	2016	2.82	2019	2020	
Competence	2015	2.73	2019	2021	
English	2019	2.71	2019	2021	

Table 4. (*Continued*).

Top 25 keywords with the strongest citation bursts					
Keywords	**Year**	**Strength**	**Begin**	**End**	**2013–2023**
Teaching practices	2020	2.71	2020	2023	
Teacher education	2016	6.73	2021	2023	
Work	2021	4.01	2021	2023	
Flipped classroom	2021	3.84	2021	2023	
Language	2016	3.35	2021	2023	
Teaching evaluation	2021	3.14	2021	2023	

4. Discussions

In 2020, with the widespread adoption of online teaching and the normalization of hybrid online and offline teaching, the proportion of online instruction significantly increased. This posed numerous challenges to traditional teaching quality evaluation methods, highlighting the imperative for effective online teaching quality evaluation as an inherent requirement in the transformation of teaching methods (Qian et al., 2021). The shift to online teaching signifies not only a change in instructional mode, but also represents a crucial opportunity for the advancement of education and teaching careers (Li and Teng, 2020).

In September 2022, the United Nations hosted the "Education Transformation Summit" at its headquarters in New York, bringing together world leaders to address priorities such as addressing learning loss since the pandemic, restructuring education systems, achieving inclusive and equitable quality education, and promoting lifelong learning for all. With technological advancements maturing, the efficiency of teaching and learning has improved, and the cost of education for students has decreased, contributing to the realization of educational equity.

This paper uses CiteSpace to make a scientific measurement analysis of the number of papers, authors and keywords of teaching quality evaluation research. Comparing the characteristics of the research in China and other countries, we can clarify the development direction of relevant research, and summarize the advantages of research in China and other countries, so as to promote the overall progress of teaching quality evaluation research. The findings reveal heightened activity in China and other countries research on teaching quality evaluation, moreover, research in both contexts predominantly comprises independent studies, supplemented by collaborative efforts. Notably, there is an increased focus on the exploration of online teaching quality evaluation, specifically delving into methodologies and systems. The emphasis has shifted towards students' learning initiatives and a comprehensive evaluation of teachers' work before, during and after class. While research in other countries has also identified new hotspots related to online teaching, the number of studies is comparatively limited. The study proposes the imperative need to update the evaluation criteria for online teaching and enhance the infrastructure of online teaching platforms. Additionally, it advocates for reforms in the evaluation systems of educational institutions and innovations of teachers' instructional methods. Based on the above research findings, this paper has the following suggestions:

(1) Expanding focus on online teaching quality evaluation:

The observed shift towards increased research on online teaching quality assessment signifies the growing significance of digital education. Future research could delve deeper into refining methodologies for evaluating the effectiveness of online teaching strategies, considering factors such as interactive engagement, technological infrastructure, and pedagogical approaches. Moreover, exploring the impact of emerging technologies, especially AI and big data, on enhancing online teaching quality could be a promising avenue for researchers.

(2) Advancing collaborative research efforts:

While independent research has been predominant, there is potential for fostering collaborative efforts in the realm of teaching quality assessment. Future studies might explore the benefits of interdisciplinary collaboration and cross-institutional research, aiming to generate comprehensive insights into effective assessment practices. By pooling diverse expertise, researchers can address multifaceted challenges associated with teaching quality in both online and traditional settings.

(3) Innovative models for online teaching quality evaluation:

The emphasis on constructing assessment frameworks and models for online teaching quality, particularly involving audio-visual analysis and big data, suggests a need for continued exploration in this domain. Future research could focus on refining and validating these models, incorporating real-time feedback mechanisms, and adapting them to various educational contexts. Investigating the scalability and adaptability of such models would contribute to their broader applicability in diverse learning environments.

(4) Holistic examination of student and teacher performance:

The evolving criteria for evaluating student and teacher performance, with a heightened emphasis on student autonomy and comprehensive assessment of instructors throughout the teaching process, present intriguing areas for future exploration. Researchers may delve into developing innovative metrics and methodologies that capture nuanced aspects of student engagement, motivation, and teacher effectiveness across different instructional phases.

(5) International collaboration and comparative studies:

The scarcity of research findings in the international domain suggests an opportunity for scholars to engage in cross-cultural studies. Future research endeavors could involve comparative analyses between teaching quality assessment practices in different countries, considering cultural, institutional, and pedagogical variations. Collaborative international efforts could lead to a more comprehensive understanding of effective teaching quality evaluation practices on a global scale.

In conclusion, the identified research directions provide a roadmap for scholars to contribute to the evolving landscape of teaching quality evaluation. By addressing these areas, researchers can enhance the effectiveness and adaptability of assessment models, contribute to the development of best practices, and ultimately support the continuous improvement of educational outcomes in diverse learning environments.

5. Conclusions

Through a comparative analysis of the research history of teaching quality

evaluation in China and other countries in the past decade, this article draws the following conclusions on the issues outlined in the introduction. Firstly, teaching quality evaluations, both in China and other countries, have witnessed heightened activity, with the number of published articles exhibiting a steady fluctuation until 2019. Remarkably, there has been a significant surge from 2020 onwards. Secondly, research on teaching quality evaluation, both in China and other countries, is primarily characterized by independent investigations, occasionally complemented by collaborative efforts. Meanwhile, in China research, scholars are increasingly emphasizing the exploration of online teaching quality evaluation. The application of Artificial Intelligence (AI) and big data has garnered substantial attention (Li et al., 2022). Furthermore, there is a focus on constructing online teaching quality evaluation system or models, including audio and video analysis, as well as big data analysis (Tang et al., 2022; Nie, 2020). Thirdly, evolving examination standards for students and teachers highlight a greater emphasis on students' learning initiative. There is also a heightened emphasis on assessing teachers' performance before, during and after class (Zhou and Fang, 2022). While research in other countries has also seen emerging hotspots related to online teaching, the corresponding research results are relatively limited.

Author contributions: Conceptualization, HZ and LD; methodology, YW; software, YW; resources, HZ and YW; writing—original draft preparation, HZ and YW; writing—review and editing, HZ and HM; supervision, LD; funding acquisition, HZ. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by [Shandong Graduate Education Quality Curriculum Project] grant number [2022CZD002] and [Project of China Higher Education Association Research Project] grant number [23STWM0410].

Availability of data and materials: The datasets used and analyzed during the current study are available from the corresponding author upon reasonable request.

Conflict of interest: The authors declare no conflict of interest.

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