

# The Visualization Analysis of TCFL Classroom Management Based on Citespace

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**Keywords:** Classroom Management, Research Hotspots, Citespace, Visualization.

**Abstract:** Nowadays, Chinese is gradually becoming an international lingua franca with an upward trend. Based on the national policy of Chinese language, in order to better promote the development of Teaching Chinese as Foreign Language (TCFL), TCFL classroom management is taken as the object in this study. The purpose is to understand the layout of classroom management research, predict the development trend of classroom management, and provide new guidelines and references for subsequent classroom management research. Bibliometric analysis methods such as keyword co-occurrence, clustering and burst detection were applied to generate a science mapping using relevant literature in the China Knowledge Network (CNKI) database from 2000-2022 as the data source. The rapid development of TCFL education in China cannot be separated from the promotion of related Confucius Institutes. In recent years, influenced by the Covid-2019 and the increasing emergence of online teaching, the research direction has also changed. The visualization analysis of classroom management research by science mapping will help the future promotion and expansion for classroom management.

## 1 INTRODUCTION

Because of people's different perceptions of classroom and management, the definition of curriculum management has different meanings. Broadly speaking, there are four different kinds of meanings. First, it is a procedure applied to achieve the goals of classroom activities. Second, it is a decision making that coordinates various relationships between individuals and groups in the classroom. Third, it is an activity that deals with various conflicts and contradictions in classroom activities. Fourth, it is a special organ that promotes the growth of the classroom (Chen Shijian, 2003). Classroom management is a constant part of the overall teaching and learning activities and has a significant impact on the effectiveness of teaching and learning. Proper teaching management can fully demonstrate the teaching vitality and learning and continuously promotes the smooth running of teaching and learning activities. In the teaching process, the teacher acts and reacts on the students. As the medium between the two, classroom management can effectively help teachers regulate the teaching environment and provide students a positive learning experience.

By screening the data on TCFL classroom management in the China Knowledge Network (CNKI) database, classroom management from various aspects, such as teaching models, teaching methods and teaching reforms, were investigated, which led to the formation of a huge research network. Based on the collection and organization of a large number of valid research records, Citespace version 5.7 R1 (64-bit) was used as the main instrument to analyze TCFL classroom management in a synchronic and diachronic, multi-dimensional and multi-perspective manner. The purpose of the study is to identify salient issues and prospects, and to think about strategies related to TCFL classroom management. The visualization analysis of Citespace is effectively applied to increase the real-world value.

## 2 THE BACKGROUND OF CITESPACE AND DATA PROCESSING

Citespace software is a modeling software for bibliometrics created by a Chinese-American scholar, Professor Chen Chaomei. The four categories of research processes with visual science mapping and

integrated approach that can be presented through Citespace can avoid the subjective nature of narrative literature reviews (See Figure 1). In this study, with the help of Citespace, a bibliometric analysis tool, a valuable overview of the research history will be provided and the structure, dynamic evolutionary patterns, and emerging themes of the field will be identified, so as to provide guidance for subsequent research. In this study, a total of 3439 relevant papers were retrieved in the search time span from January 2000 to January 2022. In order to ensure the accuracy of the data samples, manual data cleaning and screening were performed for each of the search results and data conversion was performed using the data function in Citespace software to convert the format of all China Knowledge Network databases into WOS format. And the whole literature was de-duplicated using the Remove Duplicates function in the WOS option, and a total of 411 valid papers were obtained.

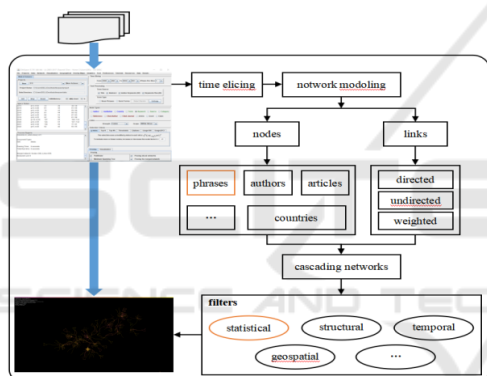


Figure 1. Citespace Flowchart.

### 3 KEYWORD CO-OCCURRENCE VIEW ANALYSIS

The Timezone View of keyword co-occurrence uses the co-occurrence of word pairs or noun phrases in a collection of literature to determine the relationships between topics and the frequency of word occurrences in the disciplines represented by the collection. The Timezone View shows the evolution of the TCFL classroom management research field, the evolution of keywords and the networked relationships that influence each other from a temporal perspective. The affinity between them is measured through the number of such co-occurrences. The Timezone View represents time on the horizontal axis, presenting the keywords of TCFL classroom management as research hotspots in different years.

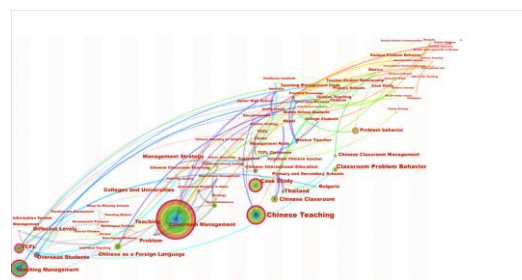


Figure 2. The Timezone View of keyword co-occurrence for TCFL classroom management.

The meaning of Centrality in the menu of Citespace software is intermediary centrality, which is an important indicator to measure the importance of nodes in the network (other common indicators to measure the importance of nodes include degree centrality, proximity centrality, etc.) Citespace software uses this indicator to discover and measure the importance of the literature, and highlights this category of literature on the view with a purple aperture. Literature with high intermediary centrality is often a key pivot connecting two different fields, also known as a "turning point" in Citespace. The equation of intermediary centrality is where denotes the number of shortest paths from s to t, and denotes the number of nodes passing through i in the shortest path from s to t. From the perspective of information transmission, the higher the intermediary centrality, the higher the importance of the nodes. The impact of these nodes on network transportation is also high when they are removed.

$$d_{st}^{BC} = \sum_{s,t \neq i} \frac{d_{st}(i)}{d_{st}} d_{st}(i)$$

Figure 2 shows the development trend of TCFL classroom management research hotspots from 2000 to 2022. From the Timezone View of keyword co-occurrence, it can be seen that there are five most significant keyword nodes in the field of TCFL classroom management research, which are densely connected to each other, indicating significantly positive correlation and inheritance among the keywords. So it can be seen that the hotspots studied in different time periods are both different and relevant. According to the distribution of nodes, the development of TCFL classroom management is divided into four stages. Taking the year 2000 as the time point, the period before 2000 is called the "pre-development stage," the period from 2000 to 2007 is called the "mid-development stage," the period from 2008 to 2014 is called the "post-development stage," and the period from 2015 to 2022 is called the "current development stage".

The first stage (before 2000) is the pre-development stage of TCFL classroom management. However, at this time, there is no in-depth research and exploration on TCFL classroom management, but more on how to promote TCFL, which belongs to the academic inquiry level rather than the teaching management level. The second stage (from 2000 to 2007) is the mid-development stage of TCFL classroom management, at which it can be seen that there are obvious research hotspots. However, the research hotspots only focus on the level of "teaching management", but not the level of classroom management. The strong policy support in China has promoted the development of TCFL and paved the way for the next stage of transformation and development. The third stage (from 2008 to 2014) is the post-development stage of TCFL classroom management, at which the research hotspots have been very obvious and intensive, and classroom management has been a research hotspot. The development of Confucius Institutes promotes the practice of TCFL. At the same time, teachers have explored the teaching and learning in detail and paid more attention to classroom management. The fourth stage (from 2015 to 2022) is the current development stage of TCFL classroom management. Based on the third stage, the research hotspots become more detailed. During the eight years, a total of 335 articles are published, which objectively reflects the research hotness of TCFL classroom management. With the continuous development of China's economy, the strengthening of the comprehensive strength, and the improvement of foreign cooperation, TCFL is becoming more and more internationalized under the trend of reform and opening up and the change of the information age.

#### 4 THE VISUALIZATION ANALYSIS OF SCIENCE MAPPING OF TCFL CLASSROOM MANAGEMENT RESERCH LITERATURE

##### 4.1 Keyword Co-Occurrence Analysis of Research Literature

"Keyword word co-occurrence network analysis, also called co-occurrence analysis, is a text content analysis technique that identifies the relationship of related topics in the subject area represented by a text by analyzing the forms in which pairs of terms (word

or noun phrase pairs) co-occur in the same text topic, so as to explore the development of the discipline." (Pan Li, 2000) Keywords are essential in academic papers. Although they are brief and occupy limited space in the paper, they are a concise summary of the content. They can be used not only to retrieve relevant literature, but also to understand the field of study.

##### 1) The Analysis of High-frequency Keyword Centrality of TCFL Classroom Management

The saved project file of TCFL classroom management was selected in Citespace visualization software, the time zone was set in Time Slicing (2000-2022), 1 year was selected as the time slice for analysis, and the node type was selected as Keyword. In this study, the generated mappings were pruned using Pathfinder, Pruning silced networks and Pruning the merged network algorithms. Based on the keyword co-occurrence mapping, the citation frequency, centrality and burst rate of keywords about TCFL classroom management from 2000 to 2022 were exported by Citespace software. (See Table 1 and Table 2).

Table 1. High-frequency words and high-centricity keywords in literature (Top20).

Number	Frequency	Centrality	Keywords
1	187	0.33	Classroom Management
2	56	0.35	Teaching Management
3	49	0.36	Chinese Teaching
4	42	0.38	Case Study
5	30	0.61	TCFL
6	25	0.04	Problem behavior
7	24	0.08	Chinese as a Foreign
8	23	0.05	Language
9	22	0.36	Chinese Classroom
10	15	0.19	Overseas Students
11	14	0.03	International Students in
12	14	0.04	China
13	12	0.05	Classroom Problem Behavior
14	11	0.28	Countermeasure
15	11	0.37	Chinese Classroom
16	10	0.13	Management
17	10	0.04	Chinese International
18	9	0.15	Education
19	8	0.02	Problem
20	8	0.03	Strategy
			Thailand
			TCFL Classroom
			Volunteer Chinese teacher
			Management

Table 2. The keyword burst rate in literature (Top 10).

Number	Keywords	The Burst Rate
1	Problem behavior	3.72
2	Thailand	2.49
3	Chinese Classroom	2.07
4	International Students in	2.01
5	China	1.88
6	Colleges and Universities	1.81
7	Philippines	1.75
8	Classroom Problem	1.68
9	Behavior	1.68
10	Coping Strategy	1.68
	Student Problem Behavior	
	Questionnaire Survey	

"The purpose of science mapping is to better understand the state and mechanism of scientific development, so it is important to interpret it. Mapping interpretation is a work that is both scientific and constructive natures. The constructive nature inevitably makes the mapping interpretation vary from person to person and it is impossible to be consistent. While the scientific nature requires the mapping interpretation to be standardized and rigorous, which needs to follow certain rules and procedures." (Chen Yue, 2015) High-frequency word analysis is to extract the frequency distribution of core content in the literature that can represent the whole stage. It is used to investigate the main research points in TCFL classroom management, so as to predict the future research direction and prospect.

Keywords are the core of an article, so articles are often based on keywords. Therefore, based on 411 valid articles, keywords were selected as the research objects for analysis, and Citespace software was used to visualize and analyze the keywords so as to obtain the keyword co-occurrence mapping. There were 390 keyword nodes and 500 node links in the keyword co-occurrence mapping, with a density of 0.0066, showing that the number of keywords in this field was large. However, there were fewer links and less density of association between keywords, so the research topics in this field were scattered. The definition of high-frequency words and low-frequency words was mainly based on the formula proposed by Donoghue:  $T = (-I + (1 + 8I)^{1/2}) / 2$ , where I is the number of keywords. The boundary threshold for high-frequency words and low-frequency words in the research field was 26.13, i.e., keywords that occur 27 times or more are high-frequency keywords in this field. As can be seen from Table 1, among all the high-frequency keywords in the 23-year development stage of TCFL classroom management (from 2000 to 2022), "classroom management" has the highest frequency of 187, followed by "teaching management", "Chinese language teaching", "case study", "TCFL teaching", "problem behavior", "TCFL" and so on. In Table 1, it can be seen that the centrality of each keyword is different. If the centrality of a node exceeds 0.1, it means that the node is a central node, indicating that it is more important and more influential in the research. As can be seen from Table 1, among all the keywords from 2000 to 2022, "TCFL" has the largest intermediary centrality of 0.61, followed by "case study", "problem behavior", "Chinese language teaching", "teaching management", "classroom management" and other keywords, indicating that TCFL classroom management in these 20 years were developed under

the gradual advancement of case study and teaching practice and they influenced each other. These keywords can pave the way for the subsequent research work and reflect the development trajectory and research focus of TCFL classroom management. The distribution and linkage of these keyword nodes objectively show the research trend of TCFL classroom management in these 23 years. Each keyword node has its historical roots, showing a progressive trend in terms of chronological order. The high-frequency keywords in Table 1 can demonstrate that TCFL has received strong support from the national policy and the strong support from the Ministry of Education during this period, and the research fields have gradually been hierarchically obvious and started to have specific branches, indicating the rapid development of relevant research in TCFL and the specific planning for classroom management in the teaching process. Therefore, TCFL classroom management is closely related to China's situation and policies, indicating that TCFL classroom management is a research field associated with China's major policies during this period. Foreigners can learn Chinese to better understand Chinese culture and play a role of cultural dissemination. At the same time, we can also take advantage of traditional culture to strengthen our cultural confidence, so as to better transmit our traditional culture and improve our cultural influence in the world.

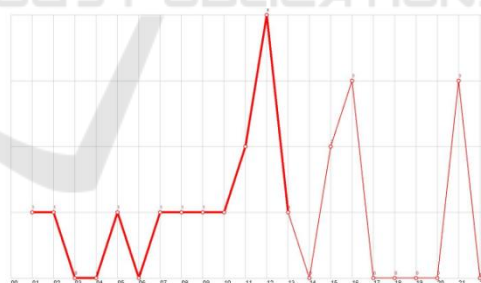


Figure 3. Overseas Students (Burst Rate: 5.83).

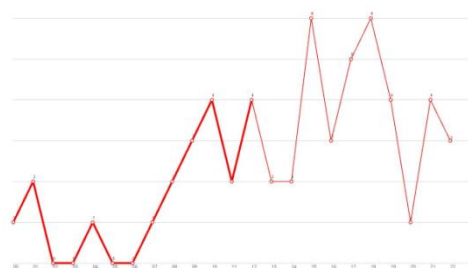


Figure 4. Teaching Management (Burst Rate: 5.21).



Figure 5. Problem Behavior (Burst Rate: 3.73).



Figure 6. Thailand (Burst Rate: 2.48).



Figure 7. Volunteer Chinese Teacher (Burst Rate: 2.35).

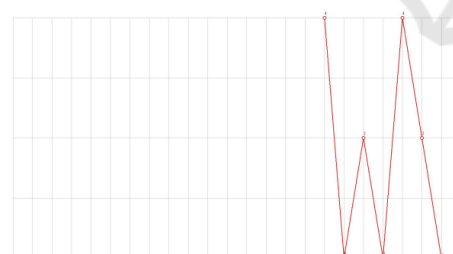


Figure 8. Overseas Students in China (Burst Rate: 2.10).

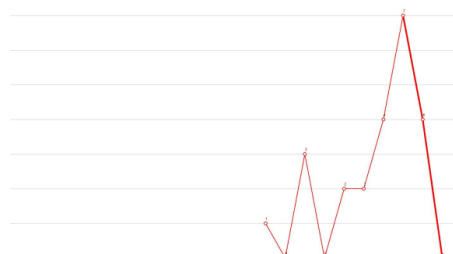


Figure 9. Chinese Classroom (Burst Rate: 2.08).

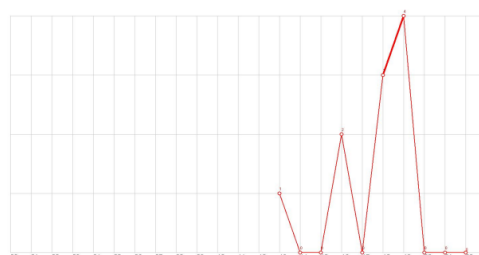


Figure 10. Chinese Classroom Management (Burst Rate: 1.97).

**Figure 3-10.** The history curves of keywords with high burst rate from 2000 to 2022.

From the data in Table 1 and Table 2, it can be seen that in the keyword co-occurrence network, there is no significantly positive correlation between the frequency and centrality of keywords and no positive correlation between the centrality of keywords and the burst rate. Based on the relevant keywords with high burst rates, the curve of keywords with high burst rate from 2000 to 2022 can be analyzed. Through these eight historical curves, it can be found that the fluctuation of "Overseas Students" and "Teaching Management" is obvious. It can be clearly seen that in Figure 3, the keywords about "Overseas Students" have the most publications in 2012, but the number of publications from 2017 to 2020 is zero. It can be clearly seen that in Figure 3, the keywords on "Overseas Students" have the most publications in 2012, but the number of publications from 2017 to 2020 is zero, which shows that the situation of Covid-2019 has a lot of impact on overseas students coming to China. In Figure 4, it can be clearly seen from the figure that teaching management has developed faster in these 23 years, and the amount of attention from scholars has increased year by year, and the overall general trend is now rising. It shows that "Teaching Management" is a research hot spot and can be used as a future research guide. In the rest of the figures, it can be found that the overall research trend is decreasing, which shows that there is still no complete system for the corresponding detailed analysis of classroom management, and it still presents a multi-dispersed situation. However, the research on the corresponding level of classroom management has been advanced overall in recent years. The Report to the 20th National Congress of the Communist Party of China pointed out that the strategy of strengthening the country through talents should be implemented in depth, and a large, well-structured and well-qualified talent team should be built from the perspective of "invigorating China through science and education

and developing a strong workforce for the modernization drive". From the perspective of "building cultural confidence and strength and securing new successes in developing socialist culture", it is proposed to enhance the influence of Chinese civilization, emphasize deepening the exchange and mutual understanding of civilizations, and promote Chinese culture to the world. International Chinese Language Education, as a medium of Chinese and foreign humanities cooperation and exchange, should not be neglected in promoting the high-quality development of international Chinese education. Classroom management is a part of teaching management, and an excellent classroom management program has a great role in promoting classroom teaching.

#### 4.2 Analysis of Burst Words in International Chinese Language Education Classroom Management

The function of Burst detection in CiteSpace can detect large changes in the number of citations at a certain time, so as to detect the decline or rise of a particular subject term or keywords. For Citespace visualization software, such information is a kind of deeper measure. The keyword burst can be detected in combination with keyword clustering analysis. The intensity and duration of keyword burst can reflect the hotspots and trends in the research field during a certain period of time. Therefore, in this study, the keywords in the international Chinese education language classroom management literature were analyzed by using Citespace software, and the results are shown in Figure 4 and Figure 5.

Interpreting from the order of burst time, the time span of keyword burst indicates the distance of their burst time. (Shen Youhua, 2004) The longer the burst time and the longer the period, the more influential the keyword is in the academic field. In turn, it can be identified as the specific distribution of academic research centers - research hotspots. Only by grasping the research hotspots can we set them as the preferred research focus direction for researchers and help scholars to control the main points of the field. Figure 3 shows that the keyword "Teaching Management" is the keyword with the longest burst period, from 2000 to 2012, which lasts for 13 years; the keyword "TCFL" also has a long burst period, from 2000 to 2010; and the burst period of the keyword "Overseas Students" lasts for 13 years from 2001 to 2013. The burst intensity values of these three keywords are 5.21, 1.84, and 5.83 respectively, which shows that classroom management is mainly based on teaching

management. The burst period of keywords at the end of the graph are short, including "Problem Behavior", "Chinese Classroom", and "Philippines" three keywords. Due to the border with China, the continuous development of Chinese teaching resources in the Philippines, the enrichment of Chinese teaching resources and the continuous improvement of the popularity of Chinese have gradually improved the problem analysis plan of Chinese teaching and teaching process in the Philippines. Therefore, these three keywords are hoped to be hotspots for research.

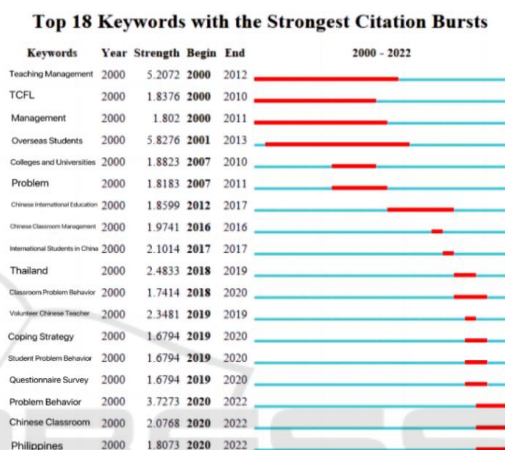


Figure 11. The keyword burst graph of international Chinese language education classroom management (ranked by year).

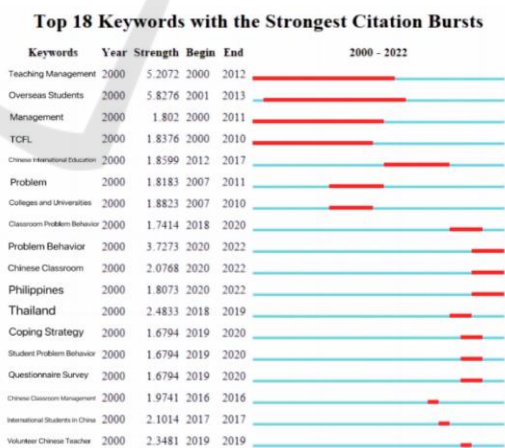


Figure 12. The keyword burst graph of international Chinese language education classroom management (ranked by burst intensity).

Interpreting from the keyword burst intensity (see Figure 5), the level of the keyword burst intensity also determines the influence of keywords. (Rawat Keshav S., 2021) The keywords "Teaching Management",

"Overseas Students", "Management", "TCFL", and "International Chinese Language Education" represent some important aspects of curriculum management in international Chinese language education. These keywords have received widespread attention and become highly influential research frontier hotspots. According to the comparison of Figure 4 and Figure 5, it can be found that the same keywords appear in both figures, such as "Teaching Management", "Overseas Students", "Management", "TCFL", etc., which have strong and continuous influences. While the research hotspots in this field are changing constantly, they also have their certain inheritance.

## 5 CONCLUSION

According to the relevant science mapping by Citespace software, combined with the development process of TCFL in China, the number of articles issued varies greatly and shows a rising trend on the whole from the time distribution of the TCFL classroom management research literature. The first stage (before 2000) is the pre-development stage of TCFL classroom management. At this stage, there is no in-depth research and exploration on TCFL classroom management, but more on how to promote TCFL, which belongs to the academic inquiry level rather than the teaching management level. The second stage (from 2000 to 2007) is the mid-development stage of TCFL classroom management. At this stage, the TCFL teaching just entered the development stage. Although classroom management is emphasized compared with the previous stage, it is still not a research hotspot. The research status at that time is visualized by the slight increase in the number of published articles. The third stage (from 2008 to 2014) is the post-development stage of TCFL classroom management. The development of Confucius Institutes promotes the practice of TCFL. At the same time, teachers have explored the teaching and learning in detail and paid more attention to classroom management. The fourth stage (from 2015 to 2022) is the current development stage of TCFL classroom management. At the post-epidemic stage, the forms of TCFL have become diversified. The combination of TCFL and information science has provided great convenience for the dissemination and reception of information. "Online teaching" begins to become an emerging hotspot. From a comprehensive perspective, the research field of TCFL classroom management is expanding continuously and the research topics are deepening constantly.

In this study, a specific science mapping analysis of TCFL classroom management was conducted using Citespace software, which is conducive to clearly showing the overall development trend, status, development hotspots and prospects of TCFL classroom management research in China. It is of great significance for the subsequent research on TCFL classroom management. It is hoped that this study can provide a reference for future research, which can make rapid progress.

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