# The Present Situation of Music Education in China: Knowledge Maps and Visualization Analysis

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**Abstract.** The development of music education in China has made great progress in the past 20 years due to the political guidance, cultural development, scientific and technological progress and educational innovation of the country. Music education represents the trends of the development of arts education in China. In this article, to get a better understanding of the research tendency and developing progress, we presented the track of the development of music education discipline through the method of visual analysis of Knowledge maps. Author and institutional collaboration mapping analysis have been conducted. Moreover, research hotspots, keyword-driven citation burst analysis and research trends have been analyzed. These results of this study can provide reference to formulate strategies for contemporary music education and policy.

**Keywords:** Music education research; visualization; style; Knowledge Maps; CNKI.

## 1.    Introduction

Since the promulgation of the first music education program in 2000, the development of music education in China has made great progress in the past 20 years [1]. This progress is closely related to the political guidance, cultural development, scientific and technological progress and educational innovation of the country [2]. As a branch of Humanities and arts, music education represents the trends of the development of arts education in China, which also reflects the different historical periods of the country's music education concept, educational content, educational forms and educational methods [1, 3]. To get a better understanding of the research tendency and developing progress, we should not only pay attention to the academic development of music, but also get the development trend of the whole music education field. In this article, we presented the track of the development of music education discipline through the method of visual analysis of Knowledge maps. These results can help us to get a better understanding of the music education development in China, which can provide clues for researchers to explore the further direction and research focus of music education.  Moreover, this study also can provide reference to formulate strategies for contemporary music education and policy.

## 2.    Materials and Methods

### 2.1 Data Sources

In this study, the original data was collected using subject retrieval method. These data were collected from the journal content in China National Knowledge Infrastructure (CNKI), which is the most frequently applied database in music education research in China.  The original data were retrieved on 5 May 2023, and the topics were set as "music education (*Yinyuejiaoyu* in Chinese)" or "music teacher education (*Yinyuejiaoshijiaoyu* in Chinese)" or "music teaching and learning (*Yinyuejiaoyuxue* in Chinese)", and the document type was set to "All". The target period was set from 2001 to 2022. Since there will be many "unrelated" or "incomplete" articles, these literatures were further confirmed. These no-author articles, newsletters, meeting notices, advertisements and solicitation type information was deleted, and the number of final obtained articles was 3,586.

**2.2 Methodology**

The date of these literatures obtained as above included title, year, source pubication, keywords, authors, abstract and references. With these data, the present situation and development trend of music education in China was investigated using knowledge maps and virsual analysis methods. Visual analysis software of CiteSpace 6.2.2 (64. bit) developed by Professor Chaomei Chen using the Java language was used in study [4]. This software can present the internal strucutre, distribution of knowledge and clues. The obtained virsulized maps using this method are known as "Mapping knowledge domains (MKD)" [5-7]. With these virsulized maps from Citespace for the research field of music education, the research hopspts in this diciple can be focused up timely. In addition, the interested topics and relevant literature can be quickly learned by users. Moreover, researchers can get new ideas and problem-solving path with these maps. Current research situation and further active research trends also can be analyzed through visuable images directly, without subjective interference of investigators.

In this paper, CiteSpace 6.2.2 visual analysis software and Excel were used to carry out the visual analysis to the music core periodicals included in CNKI. Based on these information, readers can follow-up related research of music education in China for futher investigation.

# 3.    Data Analysis

The change in the number of publications can provide a clear and intuitive overview of the development and trends in the field of expertise. We have evaluated the volume of publications in CNKI from 2001 to 2022 in music education in China. In 2000, the Ministry of Education of China formulated and promulgated the first music education syllabus of the 21st century "The Music Curriculum Standards". In the decade since then, music education in China developed rapidly. There has been significant development in the field of music education. The practice and exploration in this domain have led to a substantial increase in the number of conducted studies. This growth has, in turn, expanded the field of music education and deepened its content.
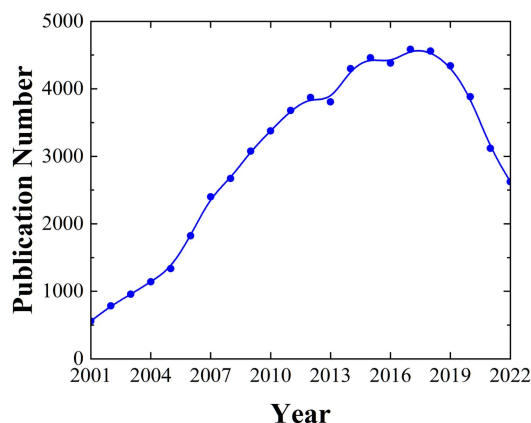


Figure 1. Publication number of music education in China from 2001 to 2022.

As in Figure 1, the number of articles published in CNKI increased five times from 2001 to 2010. The number of publications related to music education reached up to 3,376, indicating that researchers in the field of music education actively have explored the development of the discipline. During this time, researchers recognized the importance of studying music education and its impact on academic achievement, social activities, and overall well-being. As a result, there was a rapid expansion of research initiatives from 2001 to 2010. In December 2011, the Ministry of Education released curriculum standards for 19 more disciplines. During the period of 2010-2013, research on music education experienced a notable advancement, marked by a consistent deepening of knowledge and a substantial number of published articles. The number of articles published during

this time remained above 3500, indicating a sustained level of scholarly activity and interest in the field.

From the beginning of 2019, the field of music education, like many other areas, was undoubtedly impacted by the uncertainties caused by the outbreak of the new coronavirus (COVID-19). While there was a decreasing trend in the number of articles published during this period, it is significant that the overall count still remained above 2500 articles. This indicates that researchers and front-line teachers in the field of music education continued to dedicate attention and importance to their work despite the difficult circumstances presented by the pandemic.

## 3.1 CiteSpace-based visual analytics

Based on the CiteSpace 6.2.2 literature analysis tool, this paper counts and analyzes 5021 documents to explore authorship, institutional collaboration, as well as the hot spots, frontiers, and trends in this research area.

### 3.1.1 Author Collaboration Mapping Study

Author co-occurrence analysis provides insight into the posting times and collaboration strength between authors in a particular domain. A collaborative map of music education researchers in China was created using the data obtained from CNKI. CiteSpace was calculated to have 427 author nodes and 15 connecting lines. After manual screening to remove authors with fewer than 10 publications, a total of 32 authors and only 4 connecting lines appeared. The network density is 0.0002. It is clear that most of the authors in the field of music education present isolated, and there is little cooperation between groups. Furthermore, there is limited network linkage between author groups, characterized by proximity to disciplinary types, dominance of individual scholars, and scarcity of teamwork among authors. This suggests that research in the field of music education in China is relatively decentralized.

### 3.1.2 Institutional Collaborative Mapping Analysis

Institutional cooperation mapping is calculated in the same way as the author mapping, as demonstrated in Figure 3. In this mapping, there are 59 unit nodes and 28 connecting lines, as shown in Figure 2. The size and color of the nodes in the graph depend on the weight of each node. Nodes with larger weights have bigger fonts and sizes. The connecting lines illustrate cooperative relationships between institutions. As can be observed in Figure 2, the network of institutions is centered around professional music colleges and music schools of Normal Universities. This centralized structure serves as a hub for research activities.
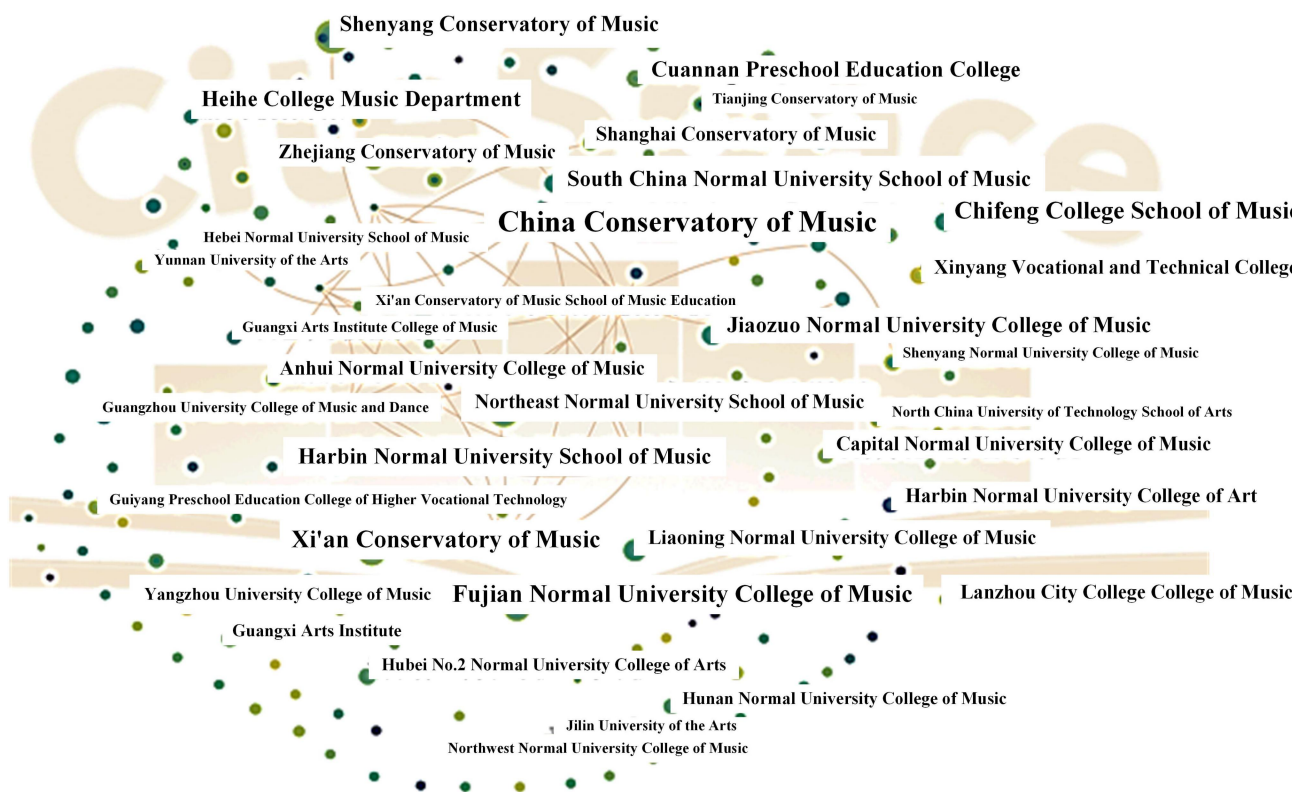
Figure 2. Knowledge graph of domestic music education research institutions

These institutions possess distinct regional advantages. For instance, in Northeast China, there are three prominent institutions: Shenyang Conservatory of Music, the Conservatory of Music of Northeast Normal University, and the Conservatory of Music of Harbin Normal University. These institutions exhibit a greater number of connecting lines, indicating a higher level of collaboration among themselves. Similarly, in East China, there are three key institutions: the Shanghai Conservatory of Music, the Anhui Normal University School of Music, and the Zhejiang Conservatory of Music. This suggests that these institutions in East China have stronger connections with each other.

These observations lead to the conclusion that cooperative institutions demonstrate typical regional aggregation characteristics in various regions, namely Northeast China, East China, South China, and Central China. Within these regions, there is a higher density of cooperation and connections among the institutions, emphasizing their interdependence and collaborative efforts.

3.1.3 Research Hotspots Analysis

In this paper, we conduct a visual analysis of keywords to explore the hot issues in the discipline. Keywords play a central role in the literature as they dominate the main content of the article and represent its essence and research direction. Therefore, understanding the keywords in the literature facilitates the analysis of hotspots and frontiers in the field of research.
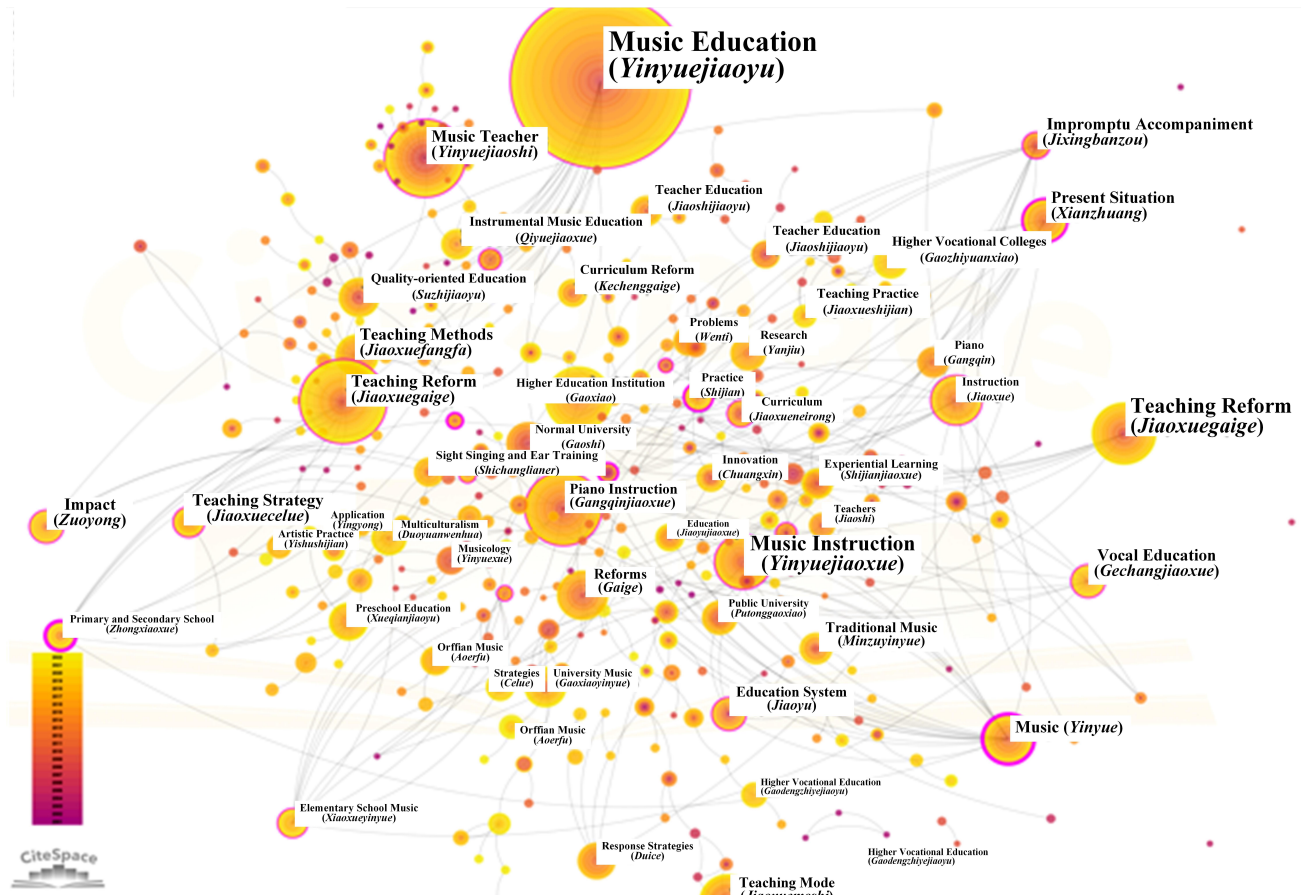
Figure 3. A map of co-occurrence of key words in music education research in China

The applied CiteSpace software utilizes the keyword-as-node covariate sub-analysis method to identify research hotspots. For this study, we extract data using the first 50 keywords and employ the Pathfinder and Pruning merging network clipping mode. Figure 3 depicts a network with 427 nodes, 456 connections, and a network density of 0.005. The circles in the figure represent keyword nodes, with larger circles indicating higher frequencies of corresponding topics. The inner color ring of each circle represents the frequency of occurrence in specific years. The thickness of the connecting lines represents the centrality of the nodes. In the CiteSpace software, keywords with a centrality greater than or equal to 0.1 are considered as inflection points in the keyword knowledge graph, representing research hotspots.

As shown in Figure 3, the keywords with centrality greater than 0.1 are: music education, music teachers, music teaching, teaching reform (0.21), piano teaching (0.14), and vocal teaching (0.12). Among these, music education (0.57) is the largest node in the relational network and plays a significant role in supporting the network. Music teachers (0.30) and music teaching (0.24) contribute to the overall stability of the network. Therefore, music education (0.57), music teachers (0.30), music teaching (0.24), pedagogical reforms (0.21), piano teaching (0.14), and vocal teaching (0.12) represent the main research hotspots in this field.

3.1.4 Keyword-Driven Citation Burst Analysis

Citation Burst analysis demonstrates dynamic concepts and active frontier areas in research, reflecting significant shifts in research hotspots. The CiteSpace's Burstness function was utilized to detect the emergence of keywords, revealing six emergent words during the period of 2001-2022. The strength of emergence indicates the degree of attention paid by scholars and exhibits a positive correlation. Over time, the field of music education has expanded, leading to continuous changes in research hotspots. By examining the evolution of the order of practice of the emergent words, we can observe that the hotspots of music education research have shifted from curriculum and piano

teachers in 2014 to core literacy, cultural heritage, reform inquiry, and cognitive persistence up until the present time.

| Keywords | Year | Strength | Begin | End | 2013-2023 |
|---|---|---|---|---|---|
| Curriculum (*Kechengshezhi*) | 2014 | 4.31 | 2014 | 2015 | |
| Piano (*Gangqin*) | 2014 | 4.18 | 2014 | 2017 | |
| Teacher (*Jiaoshi*) | 2014 | 3.86 | 2014 | 2015 | |
| Core Literacy (*Hexinsuyang*) | 2018 | 4.16 | 2018 | 2023 | |
| Cultural Inheritance (*Wenhuachuancheng*) | 2020 | 4.64 | 2020 | 2021 | |
| Reform Exploration (*Gaigetanjiu*) | 2021 | 12.99 | 2021 | 2023 | |

Figure 4. Keyword-driven citation burst analysis in the field of music education

### 3.1.5 Analysis of Research Trends

Research frontiers refer to potential research questions within a field, and clustering nodes with obvious co-word relationships into a class can accurately depict the focus of the research frontiers (Gong Botao, 2019). The scientific knowledge graph, specifically the timeline view of keyword clustering, makes it easy to observe the time span of literature related to the research topic.

After running CiteSpace software, a total of 47 items were generated for keyword mapping, and 9 clusters with high clustering (Modularity Q = 0.859 > 0.7) were manually selected (see Figure 6). As depicted in Figure 6, the research centered around 15 themes: music, higher education, teaching reform, music teaching, importance, music education, significance, music literacy, music teacher, new system, teaching methods, fusion, pre-primary education, vocal teaching, and impromptu accompaniment.
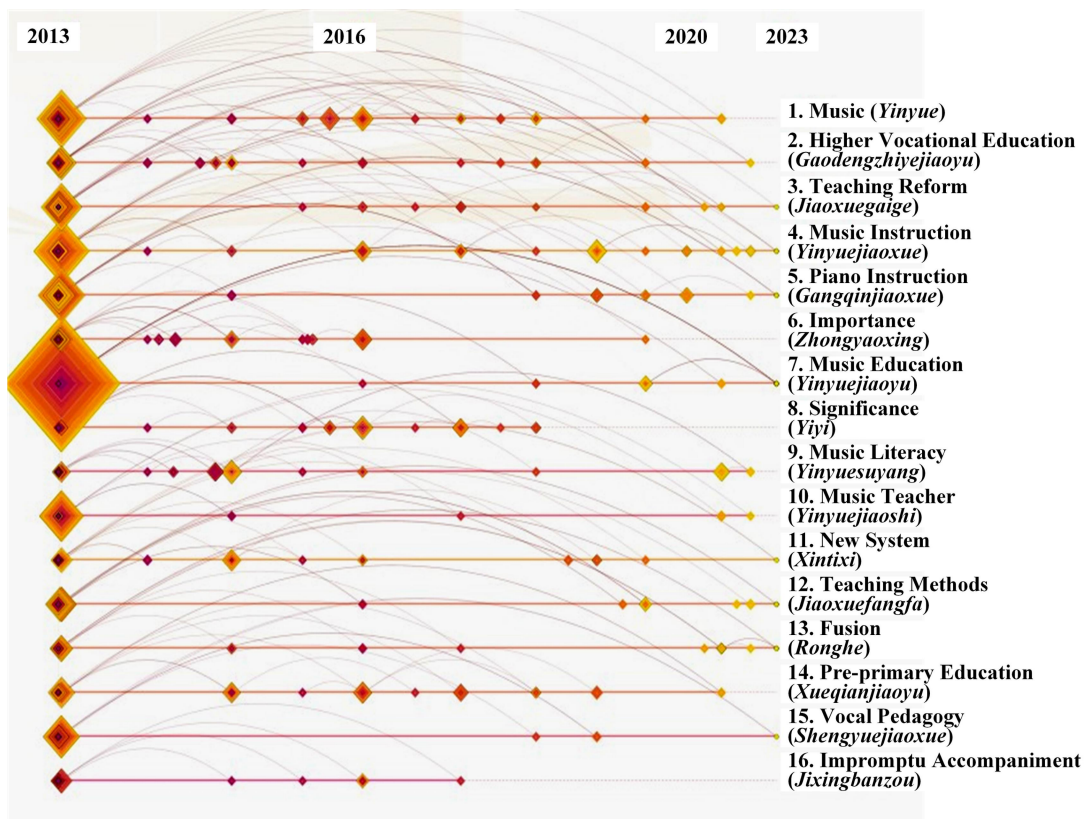


Figure 5.Knowledge map (timeline view) of keyword clustering in music education research

With the passage of time and changes in national aesthetic education policies, the research hotspots in the field of music education have expanded. Since the promulgation of the Music Curriculum Standard (2011 Edition), research related to music education in 2013 experienced an

explosive manifestation, and the number of high-frequency keyword nodes continued to increase from 2013 to 2016. The research theme continued to expand, covering all educational stages. Simultaneously, the scope of research also grew.

As illustrated in Figure 5, research on music education in higher education institutions and preschools has been ongoing, teaching reform has persisted, and the issue of the importance of music education reached its peak in 2016. From the second half of 2019 onwards, the number of nodes related to music education research fluctuates, indicating that research is more scattered and diversified at this stage. This observation aligns with the analysis of publication numbers, which primarily comprise in-depth studies of numerous emerging research topics from the previous period.

## 4.     Conclusions

Knowledge mapping reveals the internal structure of knowledge through its dual characteristics of "map" and "spectrum", allowing us to explore the dynamic characteristics of scientific knowledge and the research field it belongs to, as well as the complex evolutionary system. By combing through the knowledge map of domestic music education research for over 20 years, we can see that this research is oriented under the political guidance of national education policies, with the practical soil of music education closely centered around the four factors of "music-teachers-students-environment". Under the policy spirit of "integrating aesthetic education into the whole process of talent cultivation in all levels and types of schools, and running through all sections of school education", research on Chinese-style music education focuses more on cultivating morality and national heritage, while future knowledge production requires closeness between interdisciplinary fusion and innovative play.

This paper analyzes the annual publication volume, authors, institutions, hotspots, frontiers, and development trends of music education research literature in China from CNKI database from 2001 to 2022. It finds that firstly, from the publication of literature, the period from 2001 to 2012 is the stage of high-speed development and exploration of music education research, the period from 2010 to 2013 is the period of steady deepening, and the period from 2020 to present is the stage of rapid development and exploration of music education research in the new era of aesthetic education. So far, it belongs to the extension stage of research on beauty education in the new era. Secondly, from the cooperation of authors and institutions, researchers mostly work individually with less teamwork, but there is more frequent connection between research institutions. The academic contribution of comprehensive teacher training colleges and universities in the field of music education and music and art colleges and universities each occupies half of the territory. Fourthly, the distribution of keyword co-occurrence, clustering, and time-zone maps show that music education research is rich in hotspots and wide-ranging in topics, demonstrating researchers' academic enthusiasm and interest in this field.

In future music research, strengthening connections between music and sister arts disciplines, as well as between music and humanities, science, and technology disciplines can be beneficial to exploring and expanding research in the field of music education. Additionally, enhancing cooperation and communication between author teams and institutions can make research more sustainable and in-depth, promoting mutual exchange and resource sharing. Based on existing research hotspots, expanding research themes can further deepen and diversify domestic music education research, reflecting the ideology of aesthetic education in the new era and the spirit of music education reform with Chinese characteristics.

## Acknowledgment

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