

The Intersection of Music, Cognition, and Education: A 20-Year Bibliometric Insight

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ABSTRACT

The integration of musical practice with cognitive science and educational frameworks represents a transformative approach to human development, yet the global evolution of this multidisciplinary discourse requires systematic mapping. This study addresses the need to synthesize fragmented literature by conducting a rigorous bibliometric analysis of research trends spanning the last two decades. The methodology involved an advanced Scopus search utilizing keywords such as music education, cognitive development, interdisciplinary approaches, STEM, academic performance, neuroscience, and psychology, which ultimately yielded a finalized dataset of 679 documents. Metadata integrity was ensured through the use of OpenRefine for data cleaning and harmonization, while the Scopus analyzer was utilized to extract longitudinal statistical and graph data. Visualization of the intellectual structure and international partnerships was achieved through VOSviewer software to map keyword co-occurrences and co-authorship networks. Numerical results indicate a significant and accelerating growth in publications, reaching a record peak of 120 articles in 2025. Geographic analysis identifies the United States and the United Kingdom as central hubs of collaboration, while China leads in total publication volume. Furthermore, citation analysis highlights foundational research on emotional mechanisms and neural plasticity as the primary intellectual pillars of the field. The study concludes that the intersection of music and cognition is increasingly defined by its impact on inclusive education and academic performance. These findings provide a vital roadmap for educators and neuroscientists navigating the complex synergy between auditory stimuli and mental development.

Keywords: music education, music cognition, cognitive development

1. INTRODUCTION

The intersection of music, cognition, and education is a multifaceted domain that explores how musical activities influence cognitive processes and educational outcomes. Music, as a universal phenomenon, not only serves aesthetic and cultural purposes but also plays a significant role in cognitive development and academic performance. This area of study investigates the cognitive connections between music and other domains such as mathematics, language, and social interaction, providing insights into how music education can enhance various cognitive abilities and contribute to holistic educational practices. By examining the interplay between music cognition and educational strategies, researchers aim to uncover the potential benefits of integrating music into educational curricula to foster interdisciplinary learning and innovation.

2. LITERATURE REVIEW

Research at the intersection of music, cognitive science, and pedagogy has revealed significant connections between musical engagement and mental development. Empirical studies demonstrate that music education enhances spatial-temporal reasoning, problem-solving, and creativity, which serve as foundational skills in Science, Technology, Engineering, and Mathematics (STEM) disciplines [1]. Musical training reinforces core mathematical concepts such as fractions, ratios, and patterns while embedding acoustic physics principles like pitch and resonance, thereby stimulating neural plasticity, attention control, and working memory [1]. Furthermore, longitudinal studies link

formal musical instruction to improved verbal memory, auditory discrimination, and phonological awareness, which directly facilitate second-language acquisition and reading literacy [2].

However, despite these documented benefits, a central debate within cognitive psychology centers on the mechanism of skill transfer—specifically, distinguishing between near-transfer (for instance, fine-grained auditory processing and motor coordination) and far-transfer (for instance, general intelligence, broad academic performance, and spatial reasoning). While early paradigm-shifting hypotheses, such as the widely contested "Mozart Effect," claimed direct general cognitive boosts, contemporary scholars argue that observed cognitive gains are largely indirect, mediated by enhanced executive functions, attention regulation, and sustained practice. Critics also highlight that many correlational findings fail to adequately control for pre-existing confounding variables, such as socioeconomic status, parental engagement, and personality traits like conscientiousness. Engaging critically with these unresolved debates is necessary to move beyond descriptive correlations toward robust, mechanistic models of neuro-educational development.

Beyond traditional academic domains, the cognitive benefits of music education engage complex multi-sensory, perceptual, and motor networks [3]. Comparative neuroimaging research reveals that trained musicians consistently outperform non-musicians in speech-in-noise processing and subcortical auditory encoding, illustrating that intensive musical expertise shapes neural pathways that extend far beyond music-specific tasks [3]. Moreover, music instruction has been shown to strengthen cognitive flexibility, working memory capacity, and emotional self-regulation, thereby exerting a holistic impact on both cognitive and non-cognitive domains [4].

Simultaneously, the intersection of music and social cognition plays a pivotal role in modern educational paradigms. Music functions as a fundamental tool for human connection, shared intentionality, and cultural expression, grounding it deeply in human social instincts [5]. Within contemporary educational settings, collaborative musical activities foster peer interaction, empathy, and community building—elements essential for developing a critical, culturally responsive pedagogy in a digitally networked society [6]. By transforming traditional instruction to reflect contemporary, technology-mediated uses of music, educators can empower students to navigate diverse social identities and cultural frameworks [6].

Furthermore, interdisciplinary theoretical frameworks—such as the enactive perspective—offer transformative alternatives to rigid, Western-centric academic models [7]. Grounded in embodied cognition and relational ontology, the enactive approach posits that musical cognition is not merely an abstract mental computation, but an active, physical, and ecological engagement with the environment [7]. This perspective encourages teachers and learners to view music as an embodied manifestation of life, fostering empathetic relationships within communities and ecological systems [7].

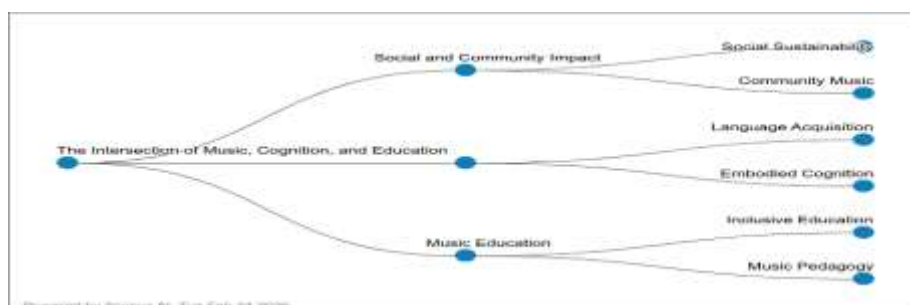


Figure 1: A Conceptual Framework of Interdisciplinary Connections Between Music, Cognitive Science, and Educational Practice

As synthesized in Figure 1, the complex dynamic between musical practices and human development operates across three primary thematic branches. Central to this framework is Music Education, which integrates inclusive pedagogy and adaptive instructional designs to accommodate diverse learner needs. Intersecting this is the domain of Cognition, examined through the dual lenses of language

acquisition and embodied cognition to emphasize how musical processes are rooted in physical and linguistic structures. Finally, the framework identifies Social and Community Impact as an indispensable outcome, where social sustainability and community-based music-making serve as pillars for collective well-being. By unifying these individual cognitive mechanisms with broader socioeconomic contexts, this conceptual synthesis demonstrates that effective music pedagogy must balance neuro-cognitive development with social impact to achieve sustainable educational transformation.

3. Research Question

RQ1: What is the annual growth and chronological trend of global scientific publications exploring the intersection of music, cognition, and education?

RQ2: Which are the top 10 most influential articles, as determined by citation count, that define the academic discourse on music-cognition integration within educational contexts?

RQ3: Which are the top 15 most productive countries and geographical regions contributing to the scholarly literature on music, cognition, and education?

RQ4: What are the most frequently used keywords and thematic clusters that characterize the research landscape of the intersection between music, cognitive science, and pedagogy?

RQ5: What are the existing patterns and structures of international co-authorship and collaborative networks among countries investigating the synergy between music, cognition, and education?

4. METHODOLOGY

Bibliometrics refers to the systematic collection, organization, and quantitative analysis of bibliographic information derived from scholarly publications [8], [9], [10]. In addition to generating descriptive indicators such as publication outlets, temporal distribution of research output, and prolific contributors [11], bibliometric analysis incorporates advanced analytical approaches, including document co-citation analysis, to uncover intellectual structures and knowledge relationships within a field.

A rigorous literature review therefore necessitates a structured and iterative procedure involving the identification of appropriate keywords, comprehensive database searching, and critical evaluation of retrieved records. Such a process enables the construction of an inclusive body of literature while ensuring the robustness and reliability of the findings [12]. Guided by this principle, the present study prioritized high-impact publications, as these works offer substantial insights into the theoretical foundations and evolving paradigms that define the research domain.

To enhance data reliability and coverage, SCOPUS was selected as the principal database for data retrieval [13], [14], [15]. In maintaining scholarly quality and consistency, only articles published in peer-reviewed academic journals were included, while books, conference lecture notes, and other non-refereed materials were intentionally excluded [16]. Leveraging Elsevier's Scopus database, recognized for its extensive indexing and multidisciplinary reach, relevant publications spanning the period from 2006 to February 2026 were systematically collected for subsequent analysis.

5. Data Search Strategy

TABLE 1

Scopus	TITLE-ABS-KEY ("music education" OR "cognitive development" OR "interdisciplinary approaches" OR "STEM" OR "academic performance" OR
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	"neuroscience" OR "psychology") AND PUBYEAR > 2005 AND PUBYEAR < 2027 AND (LIMIT-TO (LANGUAGE , "English")) AND (EXCLUDE (DOCTYPE , "dp") OR EXCLUDE (DOCTYPE , "no") OR EXCLUDE (DOCTYPE , "sh") OR EXCLUDE (DOCTYPE , "tb") OR EXCLUDE (DOCTYPE , "ed"))
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The search string.

TABLE 2 The selection criterion is searching

Criterion	Inclusion	Exclusion
Language	English	Non-English
Time line	2006 – 2026	< 2026
Literature type	Journal (Article) Conference paper Book chapter Review Book Conference review	Data paper Note Short survey Retracted Editorial
Publication Stage	Final In Press	None

The initial data collection phase was executed through an advanced search on the Scopus database using the structured query outlined in **Table 1**. This search string was formulated to capture scholarly works where core themes of music pedagogy and cognitive science intersect with academic performance and psychological frameworks. By utilizing Boolean operators (such as OR and AND), the query synthesized diverse yet related fields—including neuroscience and interdisciplinary approaches like STEM—to ensure comprehensive coverage. The timeframe was restricted to publications between 2006 and early 2026 to maintain contemporary relevance while providing a 20-year longitudinal perspective. Search parameters were limited to English-language publications to maintain linguistic consistency during data synthesis.

Following the initial search, which yielded 1,142 raw document records, a systematic multi-stage screening process was conducted in accordance with the inclusion and exclusion criteria detailed in Table 2. During primary screening, 463 records (~40.5%) were excluded due to falling outside the target publication formats (e.g., editorials, notes, short surveys, data papers, and retracted articles) or non-English language criteria. Secondary screening filtered out records lacking complete bibliographic metadata or clear publication status. This refinement resulted in a finalized dataset of 679 high-quality documents retained for bibliometric mapping. The raw bibliographic metadata was subsequently imported into OpenRefine for data harmonization and cleaning. This preprocessing step involved standardizing author names, resolving organizational affiliation variants, unifying keyword synonyms (e.g., merging singular/plural forms), and eliminating duplicate records to ensure data integrity prior to network visualization.

Recognizing that broad Boolean search strings across multidisciplinary fields can introduce noise or potential keyword omission bias, the initial search strategy underwent exploratory validation. To verify query precision and recall, preliminary search iterations were reviewed against benchmark literature in music cognition. While Scopus offers comprehensive coverage across neurosciences and social sciences, relying on a single search string inherently presents scope limitations. Future research could further validate these dataset boundaries through formal expert panel consultations or sensitivity analyses comparing Scopus records against complementary databases like Web of Science or PubMed.

6. Data Analysis

VOSviewer is a user-friendly bibliometric software developed by Nees Jan van Eck and Ludo Waltman at Leiden University, Netherlands [17], [18]. Widely utilized for visualizing and analyzing scientific literature, the tool specializes in creating intuitive network visualizations, clustering related items, and generating density maps. Its versatility allows for the examination of co-authorship, co-citation, and keyword co-occurrence networks, providing researchers with a comprehensive understanding of research landscapes. The interactive interface, coupled with continuous updates, ensures efficient and dynamic exploration of large datasets. VOSviewer's ability to compute metrics, customize visualizations, and its compatibility with various bibliometric data sources make it a valuable resource for scholars seeking insights into complex research domains.

One of the standout features of VOSviewer is its capacity to transform intricate bibliometric datasets into visually interpretable maps and charts. With a focus on network visualization, the software excels in clustering related items, analyzing keyword co-occurrence patterns, and generating density maps. Researchers benefit from its user-friendly interface, enabling both novice and experienced users to explore research landscapes efficiently. VOSviewer's continuous development ensures it remains at the forefront of bibliometric analysis, offering valuable insights through metrics computation and customizable visualizations. Its adaptability to different types of bibliometric data, such as co-authorship and citation networks, positions VOSviewer as a versatile and indispensable tool for scholars seeking deeper understanding and meaningful insights within their research domains.

Datasets comprising information on the publication year, title, author name, journal, citation, and keywords in PlainText format were procured from the Scopus database, spanning the period from 2006 to February 2026. These datasets were then analyzed using VOSviewer software version 1.6.19. Through the application of VOS clustering and mapping techniques, this software facilitated the examination and generation of maps. Offering an alternative to the Multidimensional Scaling (MDS) approach, VOSViewer focuses on situating items within low-dimensional spaces, ensuring that the proximity between any two items accurately reflects their relatedness and similarity [18]. In this respect, VOSViewer shares a similarity with the MDS approach [19]. Diverging from MDS, which primarily engages in the computation of similarity metrics like cosine and Jaccard indices, VOS utilizes a more fitting method for normalizing co-occurrence frequencies such as, the association strength (AS_{ij}) and it is calculated as [20]:

$$AS_{ij} = \frac{C_{ij}}{w_i w_j}$$

which is “proportional to the ratio between on the one hand the observed number of cooccurrences of *i* and *j* and on the other hand the expected number of co-occurrences of *i* and *j* under the assumption that co-occurrences of *i* and *j* are statistically independent” [20].

7. FINDINGS

RQ1: What is the annual growth and chronological trend of global scientific publications exploring the intersection of music, cognition, and education?

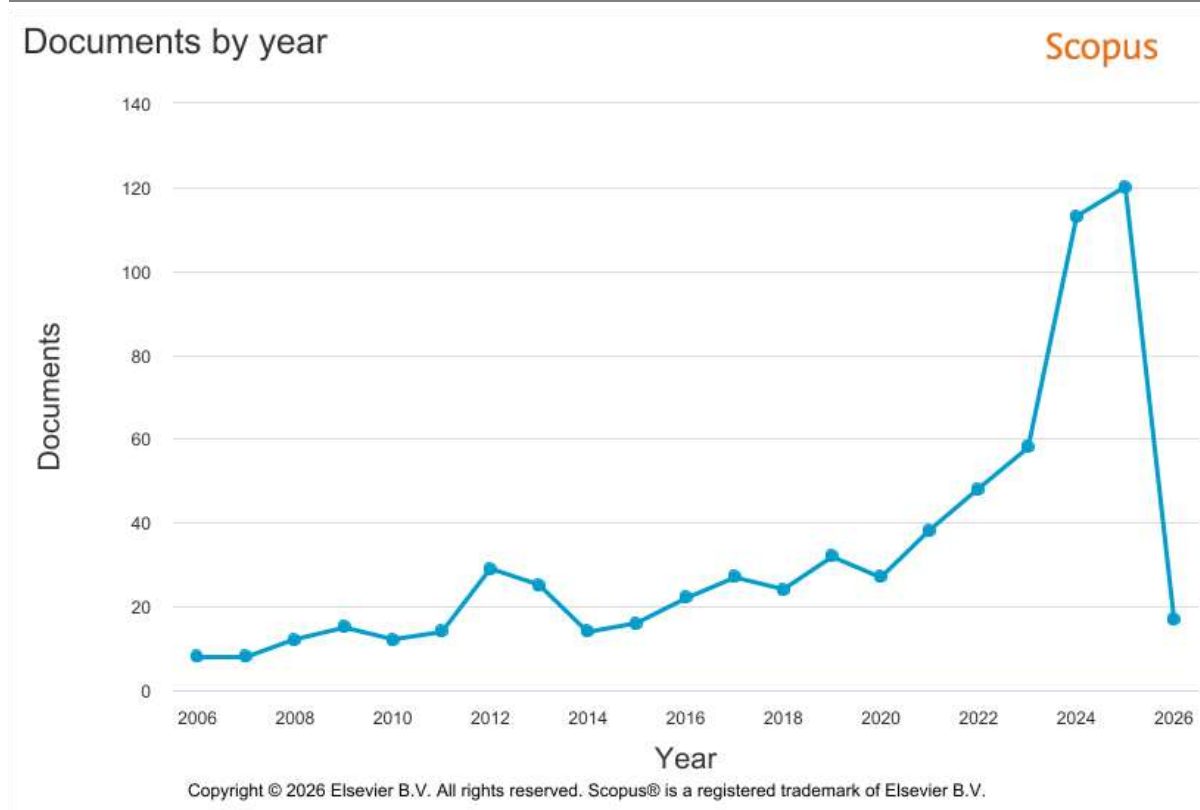


Figure 2: Annual Growth and Temporal Distribution of Scholarly Publications on Music, Cognition, and Education (2006 through 2026)

The longitudinal publication trends regarding the intersection of music, cognition, and education exhibit a consistent and accelerating growth pattern over the twenty-year period from 2006 through 2026. Data extracted for this study show a foundational phase between 2006 and 2010 with annual outputs remaining in the single or low double digits, starting at just 8 publications in 2006. A steady moderate increase followed through the 2010s, but a significant surge in academic interest is observed entering the current decade. Specifically, the volume of research grew from 27 articles in 2020 to 58 in 2023, eventually reaching a record peak of 120 publications by 2025. As illustrated in Figure 2, the dramatic escalation in volume, particularly the doubling of output between 2023 and 2025, underscores a fundamental shift in the academic landscape as researchers increasingly prioritize the multidisciplinary links between auditory stimuli and mental development.

The primary justification for this rapid expansion in literature is the global advancement of neuroimaging technologies and the democratization of cognitive assessment tools which occurred during this period. The emergence of accessible data regarding brain plasticity and the cognitive benefits of musical training catalyzed new inquiries into language acquisition and embodied cognition. Furthermore, the modern educational context is being redefined by these innovations, necessitating fresh investigations into inclusive education and specialized music pedagogy. This surge suggests that music is no longer viewed merely as an aesthetic pursuit but as a transformative cognitive tool that fundamentally alters academic performance and psychological well-being. Consequently, the academic community has responded to these scientific advancements with a multi-disciplinary effort to document the role of musical education in reshaping social identity and cognitive potential across diverse learning environments.

RQ2: Which are the top 10 most influential articles, as determined by citation count, that define the academic discourse on music-cognition integration within educational contexts?

Table 3: Highly Cited Publications and Scholarly Impact within the Intersection of Music, Cognition,

and Education

Authors	Title	Year	Source title	Cited by
[21]	Emotional responses to music: The need to consider underlying mechanisms	2008	Behavioral and Brain Sciences	1347
[22]	Ten years of brainage as a neuroimaging biomarker of brain aging: What insights have we gained?	2019	Frontiers in Neurology	426
[23]	Long-term positive associations between music lessons and IQ	2006	Journal of Educational Psychology	319
[24]	Psychosocial interventions for anxiety and depression in adult cancer patients: Achievements and challenges	2008	CA Cancer Journal for Clinicians	306
[25]	Trends in media use	2008	Future of Children	253
[26]	Behavioral and neural correlates of executive functioning in musicians and non-musicians	2014	PLoS ONE	234
[27]	How musical training affects cognitive development: Rhythm, reward and other modulating variables	2014	Frontiers in Neuroscience	229
[28]	Musical Gestures: Sound, movement, and meaning	2009	Musical Gestures: Sound, Movement, and Meaning	206
[29]	Toward a science of exceptional achievement: Attaining superior performance through deliberate practice	2009	Annals of the New York Academy of Sciences	188
[30]	From the functions of music-to-music preference	2009	Psychology of Music	181

The citation data presented in Table 3 reveals a significant concentration of academic interest in the psychological and emotional foundations of musical experiences and their long-term developmental effects. Leading the dataset is the seminal work by Juslin from 2008 which has amassed an impressive 1347 citations by exploring the emotional mechanisms triggered by music. This is followed by Franke and colleagues whose 2019 research on brain age has garnered 426 citations, while Schellenberg's 2006 study on the long-term benefits of music lessons holds 319 citations. Other influential works include Jacobsen's research on psychosocial oncology with 306 citations and Zuk's behavioral study from 2014 with 234 citations. The remaining high impact articles by Miendlarzewska, Godoy, and Ericsson further emphasize the diverse technical applications of music in neuroscience and cognitive skill acquisition, ranging from musical gestures to the systematic development of expertise.

The primary justification for these high citation counts lies in the foundational nature of these studies

which bridge the gap between abstract music theory and measurable cognitive or physiological outcomes. Juslin's work likely achieved the highest citation status because it provides a universal framework for understanding how music affects human affect, which is a core concern for both psychologists and educators. Furthermore, the high citation rates for longitudinal studies and brain research suggest that the academic community prioritizes evidence that proves the tangible impact of musical training on neural plasticity and academic performance. The inclusion of works spanning from 2006 through 2019 reflects a period of intense growth where the integration of music into clinical and educational settings became a major research frontier. This concentration indicates that scholars value research that offers both rigorous theoretical synthesis and practical data which can be applied to enhance inclusive education and social wellbeing across various global contexts.

RQ3: Which are the top 15 most productive countries and geographical regions contributing to the scholarly literature on music, cognition, and education?



Figure 3: Geographical Distribution of Scholarly Research on Music, Cognition, and Education

The global landscape of scientific contributions regarding the intersection of music, cognitive science, and education reveals a highly concentrated output within specific regions, as illustrated in Figure 3. China leads the research domain with 159 publications, establishing a significant gap over Italy, which ranks second with 96 articles. India maintains a strong presence with 64 publications, followed by the United States (35) and the United Kingdom (33). European scholarly interest remains robust, with Greece contributing 30 works and France adding 20. Furthermore, emerging research hubs in Southeast Asia, specifically Indonesia (16 publications) and Malaysia (12), indicate an expanding regional focus on integrating computational or interdisciplinary approaches into local educational frameworks. China's dominant publication volume is largely driven by deliberate national policy shifts, such as government mandates integrating arts into STEM frameworks (STEAM education) and targeted state funding for interdisciplinary neuro-educational research. National initiatives prioritizing early childhood cognitive development, cultural preservation, and digital educational infrastructure have further propelled Chinese institutions to the forefront of this domain. Similarly, the high rankings of Italy and Greece reflect their deep historical ties to music pedagogy combined with modern technological efforts to preserve and analyze musical heritage. The strong output from the United States and the United Kingdom stems from established academic networks and mature psychological and neuroscience infrastructures. Finally, the emerging contributions from nations such as Indonesia and Malaysia highlight a broader global movement where diverse cultures are investigating how music education enhances cognitive development and academic performance.

RQ4: What are the most frequently used keywords and thematic clusters that characterize the research landscape of the intersection between music, cognitive science, and pedagogy?

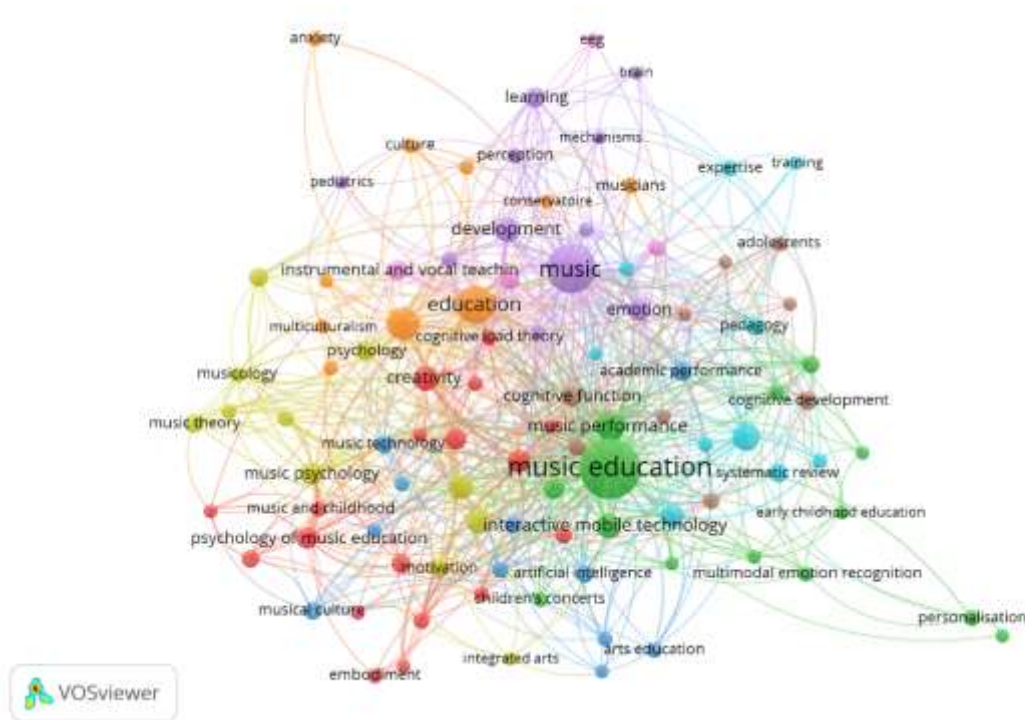


Figure 4: Mapping the Thematic Landscape of Music, Cognition, and Education through Keyword Co-occurrence Analysis

The concept of author keyword co-occurrence analysis in VOSviewer is a bibliometric technique that identifies the underlying thematic structure of a research field by examining the frequency with which specific terms appear together in scholarly documents. This method operates on the principle that the recurring pairing of keywords indicates a strong conceptual relationship and intellectual proximity between different topics within the academic discourse. To generate the network visualization presented in Figure 4, a full counting method was applied to a dataset containing a total of 1564 unique keywords. A minimum frequency threshold was established at 5 occurrences, resulting in 98 keywords that qualified for the final map. Furthermore, by setting the minimum cluster size to 5, the VOSviewer algorithm effectively organized these terms into 9 distinct thematic clusters, where the spatial distance and link strength between nodes illustrate the relative significance and interconnectedness of topics within the intersection of music and cognitive science.

The results of this analysis contribute significantly to the current body of knowledge by highlighting the critical technical and pedagogical pillars that define the integration of music and cognition. High frequency nodes such as music education with 86 occurrences and music with 58 occurrences serve as the primary anchors of the network, connecting to specialized domains like music psychology, music therapy, and neuroscience. The data reveals a robust focus on developmental stages and learning outcomes through terms such as cognitive development, children, academic performance, and executive functions, which demonstrate how musical training is linked to cognitive enhancement. Moreover, the emergence of keywords like interactive mobile technology, artificial intelligence, and deep learning indicates a growing scholarly interest in the role of digital innovation in modern pedagogy. By identifying clusters ranging from emotional intelligence and wellbeing to multiculturalism and traditional music, this visualization provides a comprehensive roadmap of how interdisciplinary research is reshaping educational methodologies to foster both cognitive growth and social sustainability across diverse learning environments.

RQ5: What are the existing patterns and structures of international co-authorship and collaborative networks among countries investigating the synergy between music, cognition, and education?

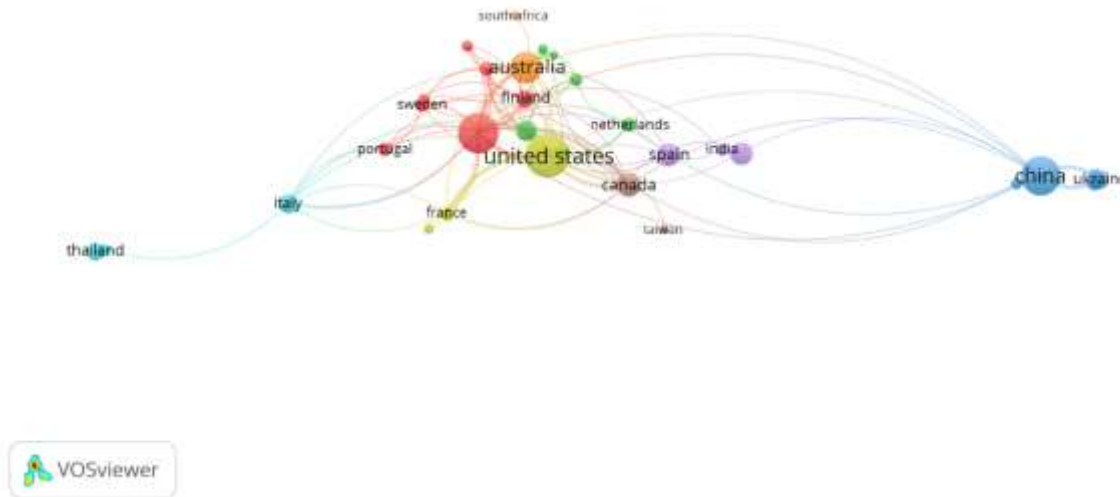


Figure 5: Global Research Networks and International Co-authorship Collaboration in Music, Cognition, and Education

The concept of co-authorship analysis by countries in VOSviewer involves the systematic mapping of international scientific partnerships to visualize how knowledge is exchanged across geographical borders. This bibliometric approach assumes that joint publications between authors from different nations represent a formal collaborative link, reflecting the global integration of a specific academic field. To generate the network visualization displayed in Figure 5, a full counting method was applied to a total pool of 74 countries. By setting a minimum productivity threshold of 5 documents per country, 33 nations qualified for the final analysis. Furthermore, with a minimum cluster size established at 5, the VOSviewer algorithm organized these collaborating nations into 8 distinct thematic clusters where the physical distance between nodes and the thickness of connecting lines indicate the strength and frequency of international scholarly alliances.

The findings from this collaboration analysis contribute significantly to the body of knowledge by identifying the central geographic hubs that drive research at the intersection of music, cognition, and education. The United States and the United Kingdom emerge as the most influential anchors of the global network, with the United States producing 108 documents and earning 2447 citations, while the United Kingdom contributes 93 documents with 1586 citations and the highest total link strength of 53. China also shows substantial productivity with 83 documents, indicating its rising role in this interdisciplinary discourse. Additionally, high citation impacts from nations such as Sweden, Australia, and Canada underscore the quality and influence of research emerging from these regions. The formation of 8 clusters suggests a highly interconnected global community where established Western academic infrastructures collaborate frequently with emerging research hubs in Asia and Europe, facilitating a diverse exchange of perspectives on how musical training influences cognitive and educational outcomes.

8. CONCLUSION

The primary objective of this investigation was to map the scholarly landscape and evolutionary trajectory of research concerning the multidisciplinary links between musical practice, cognitive science, and educational frameworks. By addressing research questions related to publication growth, influential literature, geographical contributions, and thematic clusters, the study provided a

comprehensive overview of how musical engagement influences mental processes and pedagogical outcomes. Key findings reveal a consistent and accelerating upward trend in global scientific output over the last two decades, peaking at a record high of 120 publications in 2025. This surge is primarily driven by advancements in neuroimaging and the democratization of cognitive assessment tools. Analysis of influential works identifies foundational research on emotional mechanisms and neural plasticity as the core intellectual pillars of the field. Geographically, the United States and the United Kingdom serve as central collaborative hubs, while China leads in total research volume due to strategic national policy shifts in STEAM education and state neuro-educational funding. Furthermore, thematic mapping highlights critical clusters ranging from inclusive education and music pedagogy to language acquisition and embodied cognition.

This study contributes to the field by synthesizing fragmented literature into a cohesive multidimensional framework. It extends existing knowledge by identifying specialized domains such as music psychology and therapy as vital components of the modern research landscape. Practically, these findings offer a clear roadmap for educators and neuroscientists, suggesting that music education should be prioritized as a transformative tool for enhancing academic performance and social well-being.

Despite these valuable insights, several methodological limitations must be acknowledged to contextualize the findings. First, the exclusive reliance on a single bibliographic database, Scopus, means that high-impact studies indexed solely in Web of Science, PubMed, or regional databases such as CNKI and SciELO were not captured. Second, restricting the search strategy to English-language publications introduces potential linguistic bias, which may underrepresent non-Western or culturally specific pedagogical models and cognitive studies published in native languages. Third, while the multi-term search string was designed to capture a broad interdisciplinary spectrum, broad Boolean queries inherently risk capturing peripheral literature or omitting niche domain studies. Future research should aim to validate search string query boundaries through formal expert consultation panels or conduct sensitivity analyses across complementary indexing databases to evaluate recall precision.

To advance the field beyond descriptive bibliometrics and address the inherent qualitative limits of metadata analysis, future studies should transition toward mixed-methods research designs. Quantitative bibliometric mapping should be actively supplemented with qualitative insights—such as semi-structured key informant interviews with leading researchers, expert panels, or in-depth institutional case studies of exemplary research centers—to examine how international co-authorship networks translate into real-world educational policies and classroom practices. Scholars should also engage more critically with underlying theoretical debates, such as distinguishing domain-general cognitive transfer from domain-specific musical skills, while evaluating the moderating roles of socioeconomic status and digital innovations like artificial intelligence on modern music pedagogy. Ultimately, this bibliometric analysis underscores the vital importance of understanding the synergy between auditory stimuli and mental development to foster holistic, sustainable, and evidence-based educational practices in a rapidly evolving world.

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