Project-Based Learning in Music Education: A Scopus-Based Bibliometric Review of Research Trends and Intellectual Structure

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Abstract: This study examines the implementation of Project-Based Learning (PjBL) in music education through a bibliometric analysis of Scopus-indexed publications from 2016 to 2025. A total of 479 relevant articles retrieved from the Scopus database were analyzed using VOSviewer to identify research trends, thematic clusters, and the intellectual structure of the field. The analysis focused on keyword co-occurrence, thematic clustering, and publication trends. The results reveal six major thematic clusters: (1) pedagogy and instructional strategies, (2) educational innovation and technology integration, (3) music, creativity, and collaboration, (4) interdisciplinary learning and 21st-century skills, (5) learning evaluation and outcomes, and (6) artificial intelligence and future-oriented music education. Publication trends indicate a substantial increase in research output, particularly after 2022, which coincides with the post-COVID-19 period and the accelerated adoption of digital learning technologies. Overall, this study provides a comprehensive mapping of PjBL research in music education, highlighting both established and emerging research themes and offering valuable implications for curriculum development and future research directions.

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Introduction

Music education encompasses cognitive, affective, and psychomotor dimensions of learning, playing a significant role in character development, creativity enhancement, and fostering cultural appreciation (Hallam, 2010; Jellison, 2015). Music instruction should focus on artistic practice activities, cultivating students' ability to engage actively with music while stimulating achievement motivation and developing improvisational and creative abilities (Hickey & Webster, 2001; Qin & Fitri, 2024).

In 21st-century education, learning processes must integrate the 4Cs: collaboration, communication, creativity, and critical thinking (Partnership for 21st Century Skills, 2009). Project-Based Learning (PjBL) has gained increasing attention as a pedagogical approach that places students at the center of learning through completion of authentic, contextual projects relevant to their lives (Thomas, 2000). This model encourages students to take active roles through project-based tasks, requiring creative thinking and producing new outcomes through exploration while maintaining control over their projects (Bell, 2010; Krajcik & Shin, 2014).

PjBL is particularly suited to music education, requiring active engagement in creating, exploring, and performing musical works as project outcomes (Wiggins, 2015). It enhances student participation, improves communication and critical thinking skills, and accommodates diverse learning styles, making it ideal for heterogeneous student populations (Krajcik & Shin, 2014). Bell (2010) notes that PjBL fosters 21st-century skills, deepens

conceptual understanding, and motivates learners through collaborative and interdisciplinary experiences, supporting academic achievement and social-emotional competencies across educational levels (Ruthmann & Dillon, 2012). The rapid advancement of educational technology has further expanded PjBL possibilities, enabling more complex and interactive music projects through software, collaborative applications, and digital platforms (Savage, 2007).

According to Larmer et al. (2015), effective PjBL involves seven essential elements: challenging problem or question, sustained inquiry, authenticity, student voice and choice, reflection, critique and revision, and public product. In music education, these are adapted to accommodate unique characteristics of musical learning and creative expression. The typical PjBL cycle in music education includes: (1) Project Launch and Inquiry: presenting authentic musical challenges with emphasis on question formulation and exploration; (2) Research and Planning: investigating musical styles, techniques, and contextual elements; (3) Creation and Experimentation: active music-making involving composition, arrangement, rehearsal, and refinement with peer feedback; (4) Performance and Presentation: presenting creations to authentic audiences; (5) Reflection and Assessment: formative and summative assessments with critical reflection on learning processes and artistic decisions (Wiggins, 2015; Mills, 2005).

Unlike PjBL in science or mathematics, music-based projects emphasize aesthetic judgment, emotional expression, and performative skills. Assessment criteria must balance objective musical competencies with subjective artistic qualities, necessitating flexible and holistic approaches (Elliott & Silverman, 2015). Music PjBL also uniquely integrates individual and ensemble dynamics, with collaborative projects developing essential social skills mirroring real-world musical practices (Ruthmann & Dillon, 2012).

Previous studies have demonstrated PjBL benefits in music education. Míguez-Souto and Gutiérrez-García (2022) found significant improvements in student outcomes, while Cuervo-Calvo and Cabedo-Mas (2024) concluded that PjBL fosters personal growth, reduces bias, and promotes reflective learning. Studies by Ruiz and Guerrero (2020) and Huang and Zhang (2021) confirmed that PjBL creates positive environments, enhances cooperative learning, and positively affects student learning. Research by Krajcik and Shin (2014) indicates increased student interest through projects, while Nugroho and Dewi (2022) and Afifah et al. (2023) found that PjBL improves musical skills and motivation.

Despite the growing body of research on Project-Based Learning (PjBL) in general education, studies that systematically map its development within music education remain limited, particularly those that integrate emerging technological perspectives. Previous studies tend to focus on classroom implementation, learning outcomes, or pedagogical strategies in isolation, leaving a gap in understanding the overall intellectual structure and evolving research directions of PjBL in music education at a global level.

This study addresses this gap by providing a bibliometric mapping of Project-Based Learning research in music education based on Scopus-indexed publications from 2016 to 2025. In addition to identifying dominant themes and research trends, this study highlights artificial intelligence as an emerging yet underexplored direction in project-based music learning, emphasizing the need to balance technological innovation with artistic authenticity and human-centered musical processes. Therefore, this study aims to analyze the research trends, thematic clusters, and future directions of Project-Based Learning in music education through bibliometric analysis.

Research Method

This study employs a qualitative research design using a bibliometric-based literature review approach. This approach is applied to systematically and thematically examine and interpret scientific publication data related to the implementation of Project-Based Learning in music education. The analysis focuses on mapping relationships among keywords, themes, and research trends within international scientific publications indexed in the Scopus database. Scopus was selected as the data source as it is one of the largest and most reputable international scholarly databases. Article retrieval was conducted using primary keywords such as *"project-based learning," "music education," "education,"* and *"teaching methods"* for the publication period spanning from 2016 to 2025.

The data collection process involved several steps: (1) conducting a literature search within the Scopus database; (2) exporting article metadata in .csv format, including information on titles, abstracts, keywords, authors, and affiliations; and (3) screening and cleaning the data to remove duplicates and irrelevant entries. The data were analyzed using VOSviewer software version 1.6.20 to visualize keyword networks and thematic clusters. The analytical procedure consisted of the following stages: (1) Keyword Co-occurrence Visualization, which identifies frequently co-occurring keywords to construct thematic representations; (2) Cluster Analysis, which groups keywords into clusters reflecting interconnected research themes; and (3) Thematic Interpretation, which qualitatively interprets the visualization results to understand research directions, trends, and scholarly contributions related to Project-Based Learning in music education.

The resulting visualizations were then analyzed descriptively and thematically in accordance with the qualitative data analysis framework proposed by Miles and Huberman (2014), involving data reduction, data display, and conclusion drawing.

Results and Discussion

The following figure presents a visualization of the keyword co-occurrence network derived from 479 articles analyzed using VOSviewer software. In this visualization, each node represents a keyword appearing in the article metadata, while the links indicate the relationships or co-occurrences of keywords within the same document. The size of each node reflects the frequency of keyword occurrence, whereas the colors represent thematic clusters that are automatically generated based on the VOSviewer mapping algorithm.
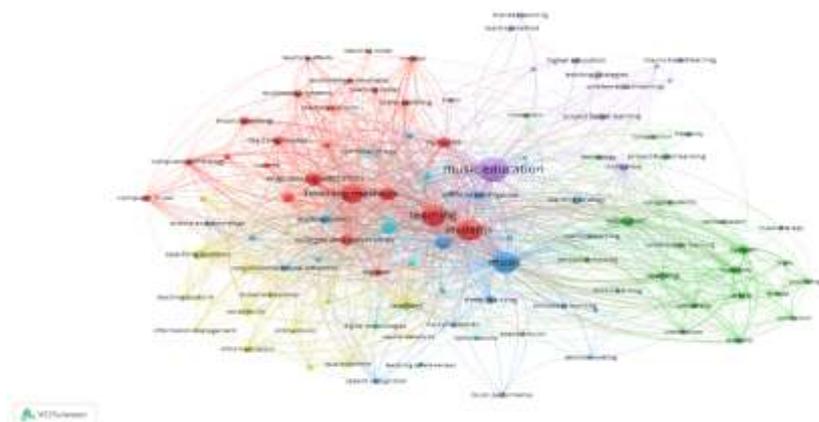

Figure 1. Co-occurrence of Author Keywords (2016–2025)

Based on the search results obtained from the Scopus database, a total of 479 scientific documents related to the implementation of Project-Based Learning in music education were identified for the period 2016–2025. The metadata from these articles were subsequently analyzed using VOSviewer to generate bibliometric visualizations based on keyword co-occurrence. The data processing yielded the following results: (1) a total of 105 keywords were identified; (2) 1,557 links were established among the keywords; (3) the total link strength reached 4,341; and (4) six thematic clusters were generated.

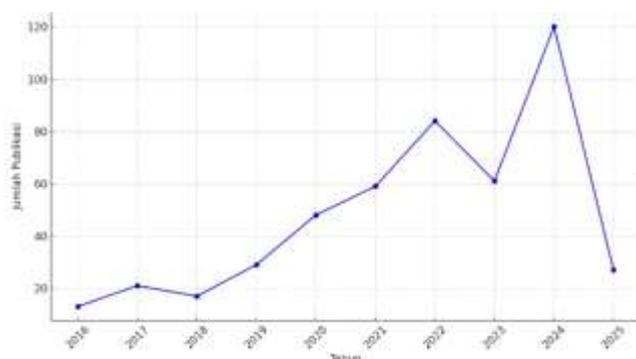**Publication Trends in Music Education per Year**

Figure 2. Publication Trends in Music Education per Year in Scopus (2016–2025)

The analysis of 479 articles retrieved from the Scopus database reveals a fluctuating yet overall upward trend in scientific publications related to music education employing a Project-Based Learning approach from 2016 to 2024. During the early period (2016–2018), the number of publications remained relatively low, ranging from approximately 10 to 25 articles per year. This indicates that Project-Based Learning was still in an exploratory phase and had not yet become a primary focus in music education research at that time. However, from 2019 to 2021, a gradual increase in publications was observed, coinciding with growing interest in project-based instructional models aligned with 21st-century learning paradigms.

The most substantial growth occurred in 2022 and particularly in 2024, when the number of publications peaked at over 100 articles. This surge corresponds with the expanded use of educational technology and the post–COVID-19 pandemic adaptation toward creative and contextual learning approaches. During this phase, topics such as digital learning, blended learning, and the use of collaborative applications in music education began to dominate the literature. In contrast, a decline in the number of publications is observed in 2025. However, this decrease is most likely attributable to incomplete data accumulation for the ongoing year rather than a genuine decline in research interest, as Scopus indexing processes are still underway.

Overall, this publication trend indicates that music education incorporating a Project-Based Learning approach has become an increasingly prominent topic among researchers worldwide. This pattern suggests that Project-Based Learning is not only widely implemented in music classrooms but is also continuously evolving as a productive and multidimensional area of scholarly inquiry.

Highest Citation Analysis

Table 1. Top Five Articles Based on Highest Citation Counts

Rank	Title	Year	Source	Citation	Reference
1	*Assessing teachers' perspectives on giving music lessons remotely during the COVID-*	2021	Sage Journals	61	39

	19 lockdown				
2	*Teaching improvisation through processes: Applications in music education*	2017	Frontiers	59	48
3	*The use of mobile internet platforms and applications in music education: A bibliometric analysis*	2023	Interactive Learning Environments	46	38
4	*Problem and project-based learning through an investigation lesson: Significant gains in creative thinking behaviour within the Australian foundation (preparatory) classroom*	2021	Elsevier	43	131
5	*From design to reflection: Effects of peer-scoring and reflective thinking on students' music composition*	2020	Elsevier	36	79

The most highly cited article is *"Assessing Teachers' Perspectives on Giving Music Lessons Remotely during the COVID-19 Lockdown"* by Biasutti et al. (2021). This study explores music teachers' perceptions of online instruction during the COVID-19 pandemic, highlighting pedagogical challenges, technological limitations, and adaptive strategies for virtual music teaching. Its high citation count indicates strong global relevance during the educational crisis and positions the article as a key reference in the field of remote music learning.

The second most cited article is *"Teaching Improvisation through Processes: Applications in Music Education"* by Biasutti (2017). This article examines process-based approaches to teaching improvisation in music education, emphasizing reflection, creativity, and active student engagement. Its focus on creative learning aligns closely with Project-Based Learning principles, contributing to its frequent citation in studies on creative music pedagogy and Project-Based Learning.

The third-ranked article, *"The Use of Mobile Internet Platforms and Applications in Music Education: A Bibliometric Analysis"* by Shi (2023), presents a bibliometric analysis of mobile internet applications in music education. The study is highly relevant to technological advancements and the digitalization of learning, supporting innovation through digital platforms in music education contexts.

The fourth most cited article is *"Problem- and Project-Based Learning through an Investigation Lesson: Significant Gains in Creative Thinking Behaviour within the Australian Foundation (Preparatory) Classroom"* by Albar and Southcott (2021). This study is closely related to Project-Based Learning, as it investigates the implementation of problem- and project-based approaches within a cross-curricular learning context. The findings highlight the contribution of Project-Based Learning to the development of creativity and problem-solving skills, which are transferable to music education settings.

The fifth highest-cited article is *"From Design to Reflection: Effects of Peer-Scoring and Reflective Thinking on Students' Music Composition"* by Chen et al. (2018). This study examines the effects of peer assessment and reflective thinking on students' music composition outcomes. Its emphasis on active learning and formative assessment aligns with the core principles of Project-Based Learning, making it a frequently cited reference in research on reflective pedagogy and alternative assessment in music education.

Findings Based on Thematic Clusters

The findings of this study indicate that research on Project-Based Learning in music education has developed significantly and reflects a multidisciplinary approach that is responsive to technological advancements and the demands of 21st-century education. The visualization analysis identified six major clusters representing the dominant themes in studies of Project-Based Learning within the field of music education: (1) Red Cluster (Pedagogy and Instructional Strategies): project-based learning, teaching methods, assessment; (2) Green Cluster (Innovation and Technology): digital learning, ICT, blended learning; (3) Blue Cluster (Music, Creativity, and Collaboration): creativity, ensemble, performance; (4) Purple Cluster (Interdisciplinary Learning and 21st-Century Skills): interdisciplinary learning, critical thinking; (5) Yellow Cluster (Learning Evaluation): student motivation, learning outcomes, feedback; and (6) Orange Cluster (Artificial Intelligence and Future Directions): artificial intelligence, gamification.
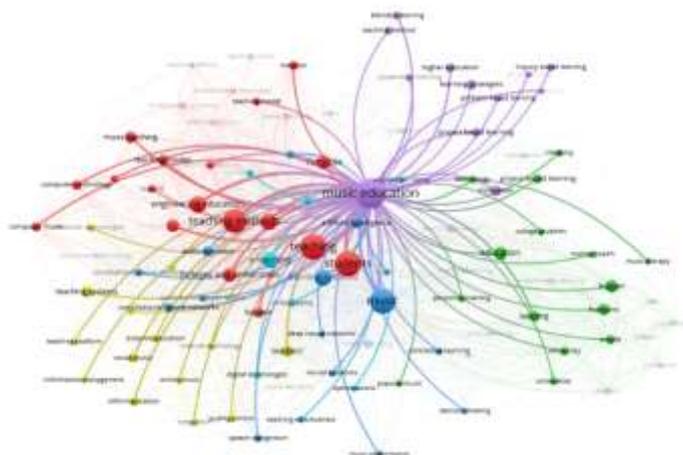

Figure 3. Findings Based on Thematic Clusters

This analysis is further supported by several highly cited publications that serve as key references in the field of Project-Based Learning in music education. For instance, Biasutti et al. (2021) highlighted the challenges and adaptations of online music instruction during the COVID-19 pandemic, emphasizing the importance of flexibility and technological integration in the virtual implementation of Project-Based Learning. In the context of creative learning, Biasutti (2017) emphasized a process-oriented approach to teaching musical improvisation, which aligns closely with the core characteristics of Project-Based Learning that prioritize creativity and exploration. Furthermore, Shi (2023) demonstrated that the use of digital applications and platforms has expanded the scope of Project-Based Learning in contemporary music education.

These findings are reinforced by the work of Albar and Southcott (2021), who examined the implementation of Project-Based Learning in cross-curricular contexts and demonstrated its effectiveness in fostering creativity and problem-solving skills across disciplines, including the arts. In addition, a study by Chen et al. (2020) underscored the importance of reflection and peer assessment in enhancing students' compositional abilities within project-based learning environments. Overall, the results suggest that Project-Based Learning in music education continues to evolve as a multidimensional and dynamic research domain, integrating pedagogical innovation, technology, creativity, and future-oriented competencies in response to the challenges of 21st-century education. Three of the six color-

coded clusters represent dominant themes in research on Project-Based Learning within the field of music education.

1) Cluster 1 (Red): Pedagogy and Instructional Strategies.

The main keywords in this cluster include *project-based learning, teaching methods, student-centered learning,* and *learning assessment*. The dominance of the red cluster indicates that existing research remains strongly focused on pedagogical approaches and instructional strategies, particularly project-based teaching methods and student-centered assessment practices. This suggests that the development of learning models emphasizing student engagement, autonomy, and active participation continues to be a primary concern in the research on Project-Based Learning in music education.

2) Cluster 2 (Green): Educational Innovation and Technology.

Key terms associated with this cluster include *technology integration, ICT, digital learning,* and *blended learning*. The green cluster highlights the importance of technological integration in Project-Based Learning practices. Studies within this cluster predominantly examine the use of ICT, digital learning environments, and blended learning models in music education. Such integration creates new opportunities for remote collaboration, digital music production, and the use of composition and recording software within the learning process.

3) Cluster 3 (Blue): Music, Creativity, and Collaboration.

The main keywords in this cluster are *music education, creativity, ensemble,* and *performance*. The blue cluster demonstrates a strong relationship between creativity and musical practice in the implementation of Project-Based Learning. Keywords such as *creativity*, *ensemble*, and *performance* emphasize that the success of Project-Based Learning in music education is highly dependent on students' ability to create and present tangible learning outcomes. This cluster also encourages exploration of project-based approaches in ensemble activities, school bands, and the performance of artistic works.

4) Cluster 4 (Purple): Interdisciplinary Learning and 21st-Century Skills.

The key terms associated with this cluster include *interdisciplinary learning, critical thinking, problem solving,* and *collaboration*. The purple cluster reinforces the position of music education within the broader framework of 21st-century skills development. Skills such as critical thinking, problem solving, and cross-disciplinary collaboration are integral components of Project-Based Learning implementation. This aligns with the demands of an increasingly complex global society and workforce, where music is viewed not only as an artistic practice but also as a medium for social reflection and communication.

5) Cluster 5 (Yellow): Learning Evaluation and Outcomes.

The main keywords in this cluster are *student motivation, learning outcomes,* and *feedback*. The yellow cluster highlights scholarly attention to motivational aspects and student learning outcomes. Many studies emphasize the importance of creating supportive, reflective, and motivating learning environments through meaningful project-based activities. This focus indicates that Project-Based Learning enhances students' affective engagement, which in turn contributes to improved learning outcomes.

6) Cluster 6 (Orange): Artificial Intelligence and the Future of Education.

Key terms in this cluster include *artificial intelligence, gamification,* and *personalized learning*. This cluster represents an emerging research trend in Project-Based

Learning (PjBL) within music education, characterized by the integration of artificial intelligence (AI), gamification, and personalized learning. Although the number of publications remains relatively limited, this cluster indicates strong potential for rapid growth alongside technological advancements and increasing demands for adaptive learning environments. AI offers opportunities to support music education by providing personalized feedback on musical performance, assisting compositional processes, and enabling adaptive learning pathways tailored to individual learners. However, the integration of AI also raises concerns regarding artistic authenticity, as music education is inherently human-centered and grounded in emotional expression and subjective aesthetic judgment that cannot be fully replicated by artificial systems (Walzer, 2022).

Research suggests that AI should function as a pedagogical assistant rather than a replacement for human instruction in music learning. AI-based systems can analyze technical aspects such as rhythmic accuracy and pitch precision and deliver immediate formative feedback, allowing teachers to focus on higher-order musical dimensions, including interpretation, phrasing, and expressive nuance (Huang et al., 2022). Within PjBL contexts, the use of AI and gamification must be carefully designed to preserve student agency, collaborative learning, and cultural diversity. Technology should enhance creative musical experiences rather than standardize learning processes, ensuring that project-based music learning remains expressive, collaborative, and artistically meaningful (Kratus, 2016).

Overall, the visualization and bibliometric analysis results provide a comprehensive picture of the direction and main themes of research related to PjBL in music education. This not only reflects the diversity of approaches and contexts of PjBL implementation but also affirms the important role of this method in developing music education that is adaptive, creative, and relevant to the times.

Most Relevant Clusters

Table 2. Most Relevant Clusters

No	Title	Author	Year	Keywords	Analysis
1	*Teaching Dilemmas and Student Motivation in Project-Based Learning Contexts in Music and Drama Education*	Nicolas A. M. B. & Ramos P. R.	2022	*project-based learning; music education; motivation; teaching dilemmas; drama education*	This article specifically explores how Project-Based Learning is implemented in music and drama education, with a particular focus on teaching dilemmas and student motivation. The authors highlight implementation challenges from teachers' perspectives, including curriculum constraints, classroom management issues, and the need to adapt project-based instructional strategies. The findings reinforce the importance of students' intrinsic motivation in the successful implementation of project-based music learning. A key strength of this article lies in its reflective and empirical approach to creative teaching practices.
2	*Service-Learning and Project-Based Learning Methodologies in Higher Music Education: A*	Cuervo-Calvo L. & Cabedo-Mas A	2024	*Music education; Project-Based Learning; Service Learning*	This article is a literature review that examines the use of Project-Based Learning and Service-Learning in higher music education. The findings indicate that PjBL contributes to the development of students' self-reflection, active participation, and sense of social responsibility. The strength of this article lies

	Review of the Literature				in its integration of two experiential learning methodologies and its contribution to strengthening the personal and professional competencies of music students. This article is highly relevant to the context of higher education and the development of students' character through music.
3	*Problem and project-based learning through an investigation lesson: Significant gains in creative thinking behaviour within the Australian foundation (preparatory) classroom*	Albar S. B. & Southcott J. E	2021	*Project-based learning; Problem-based learning; Early childhood creativity across curriculum; Creative process; Investigation lesson; Teacher-child interactions*	This article is one of the most frequently cited and relevant studies in the field of Project-Based Learning. The study highlights the implementation of project-based and problem-solving learning within a cross-curricular context in early childhood education. With a strong emphasis on the development of creativity, exploration, and arts-based learning processes, the article provides important insights into how PjBL can be used as a pedagogical approach to foster artistic exploration and creative thinking skills from an early age. In addition, the study presents a pedagogical framework that supports interactive, collaborative, and learner-centered learning experiences.
4	*Innovative music education: Using an AI-based intelligent music teaching system to assist project-based learning*	Lv H. Z	2023	*Academic performance; Artificial intelligence; Music education; Teaching model*	This article integrates Project-Based Learning with an artificial intelligence–based music learning system. Focusing on learning efficiency and the improvement of academic performance, the study presents an innovative instructional model that supports technology-driven project work. Its main contribution lies in demonstrating how advanced technologies such as artificial intelligence can enhance project-based learning practices, particularly within digital and adaptive learning environments. The article represents a forward-looking direction for technology-based music education.
5	*Design and validation of a music technology course using Project-Based Learning and collaborative learning*	Tejada J. & Morel T. T	2019	*Collaborative learning; Digital educational objects; Music education; Project-Based Learning*	This study examines the design and validation of a Project-Based Learning (PjBL)–oriented music technology curriculum grounded in collaborative learning. The researchers emphasize the importance of students' active involvement in designing projects and utilizing digital media. The findings indicate that students not only develop an understanding of music technology but also acquire essential skills in teamwork and project management. This article is significant in demonstrating how

PjBL can be systematically and structurally implemented in the curriculum design of technology-based music education.

The five articles discussed above enrich the understanding of the implementation of Project-Based Learning across various music education contexts, ranging from primary to higher education and from pedagogical orientations to technological development. These studies highlight key themes such as motivation, reflection, creativity, collaboration, and digital innovation, all of which align closely with the thematic clusters identified in the bibliometric analysis.

The findings of this study can be utilized by educators and curriculum developers to design music learning experiences that are contextual, relevant, and grounded in authentic practice. Project-Based Learning encourages students to actively explore, create, and perform musical works as outcomes of the learning process. By integrating digital technologies, teachers can develop engaging, adaptive, and inclusive collaborative projects, including those implemented in hybrid and online learning environments.

Conceptually, this study contributes to the academic literature on the effectiveness of Project-Based Learning approaches in arts education, particularly in music. Beyond reinforcing the value of Project-Based Learning as a constructivist pedagogical strategy, this review underscores the importance of interdisciplinary development and responsiveness to technological advancement. The findings may serve as a foundation for the development of new conceptual models that integrate Project-Based Learning, musical creativity, and artificial intelligence in future music education.

Conclusion

This study demonstrates that PjBL implementation in music education is pedagogically relevant with broad, evolving thematic scope. Through bibliometric analysis of 479 Scopus articles (2016-2025), six major clusters were identified reflecting global research directions. Findings indicate PjBL in music education is adaptive, innovative, with substantial development potential. Thematic visual maps reveal PjBL effectively bridges various music learning needs, developing cognitive and affective competencies while facilitating creativity and collaboration. Increasing technology integration and interdisciplinary approaches strengthen PjBL as effective, contextually relevant instructional strategy.

Recommendation

Music educators should systematically integrate PjBL approaches across educational levels, tailoring implementation to learner characteristics and local contexts, including community-based traditional music exploration. Educational institutions should provide professional development for teachers to design creative, collaborative project-based experiences.

Academically, future research should focus on empirical investigations in local contexts, particularly in Indonesia and developing countries. Further studies should develop structured, context-sensitive effectiveness indicators. Integration of PjBL with emerging technologies artificial intelligence, gamification, digital platforms, represents promising future research directions.

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