

Enhancing Music Notation Reading in Teachers through the Kodály Method and Technological Integration

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ARTICLE INFO

Article history

Received 20 November 2025

Revised 1 March 2026

Accepted 30 March 2026

ABSTRACT

This study aims to explore the application of the Kodály method in improving music notation reading skills among in-service and pre-service music teachers, as well as the challenges encountered in its implementation. The research method employed is a Systematic Literature Review (SLR), which involved 22 studies that met the inclusion criteria from a pool of 414 articles selected via a Scopus database search using the keywords “Kodaly”, “teacher music skill”, “teacher music learning”, “music literacy”, “notation learning”, “Pre-service music teachers”, “Music teaching methods”, “Music teacher training”, and “Mu-sic education curriculum”. The selection process was based on publication year criteria (2015 to 2025) and relevance to the research topic. All selected articles possessed an active DOI and were available for free download via the Scopus database using the Watase.web.id tool. From the screening process, 237 articles were removed for not meeting the criteria, and a further 98 articles were excluded as they were not classified as Q1, Q2, Q3, or Q4 journals. Following the screening, 22 articles were assessed for eligibility and included in the systematic review. The results indicate that the application of the Kodály method is effective in enhancing music notation reading skills through its sound-based, kinesthetic, and music theory approaches. However, the primary challenges in implementation were identified as a lack of adequate teacher training and limited resources in many schools. Technology and project-based approaches were found to enrich the learning experience, making the instruction more interactive and relevant to contemporary developments. This study

affirms the importance of continuous training and technology integration to strengthen the teaching of the Kodály method within music education contexts.

Keywords

Kodály Method
Music Education
Music Notation
Reading Skills
Technology in Education

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Introduction

Music education in Indonesia faces complex challenges, particularly in developing fundamental musical skills, such as the ability to read musical notation [1]. Music notation literacy is a crucial foundational skill for prospective elementary school teachers, enabling them to teach music effectively in the classroom. If teachers lack this competency, they will encounter difficulties in teaching new and complex songs, potentially leading to inaccuracies in pitch or rhythm, and will be unable to utilize score-based learning resources [2]. Consequently, the learning process may become monotonous and insufficiently challenging for students.

One established method for teaching music notation reading is the Kodály method, which employs a sound-based, kinesthetic, and notational approach to introduce students to basic musical concepts. Thayer et al. [3] demonstrate that technology can enrich the music learning experience, including in the domain of reading notation, through the use of more interactive and engaging learning tools. Nevertheless, numerous challenges persist in the pedagogy of music notation reading, both among students and prospective music teachers. Therefore, this research is essential to explore how the Kodály method, integrated with technology, can enhance music notation reading skills among in-service and pre-service music teachers.

The utilization of the Kodály method has proven effective, particularly when adapted to improve notation reading skills for teachers and teacher candidates. Pino and Viladot [4], in their research, emphasize the importance of inclusive training for music teachers, who require instruction not only in technical skills but also in managing student diversity in the classroom. This indicates that prospective music teachers must possess notation reading skills to teach music to all students, including those with disabilities or special needs. Furthermore, Shaw et al. [5] show that music performance anxiety can hinder students' ability to demonstrate their musical skills, including reading and interpreting musical notation. Hence, by employing the sound- and movement-based Kodály method, coupled with technology

integration, both students and prospective teachers can feel more comfortable learning and applying musical notation [6].

The Kodály method itself is widely recognized as an effective approach to music pedagogy globally, as it prioritizes profound musical experiences for students [2]. González-Martín and Valls [7] indicate that a project-based approach can enhance students' understanding of music theory, including reading and writing musical notation, by directly involving them in applied music projects. This study proposes the use of the Kodály method with a project-based approach, integrated with technology, to improve the notation reading skills of prospective music teachers. Baek [8] also emphasizes the importance of engaging pre-service teachers in creating their own learning materials, which can deepen their understanding of musical notation and enrich their teaching skills. Thus, this research will focus on integrating three key elements: the Kodály method, technology, and a project-based approach, to enhance music notation literacy among in-service and pre-service music teachers.

The primary objective of this research is to explore how the use of the technology-integrated Kodály method can improve the music notation reading skills of teachers and teacher candidates. This study aims to identify the effectiveness of instruction that combines the traditional Kodály method with modern elements such as technology and project-based learning. By incorporating technology into notation pedagogy, prospective music teachers can more easily access interactive materials and exercises, potentially accelerating their learning process [3]. Li [9] discusses how technology can improve music notation instruction by making lessons more engaging, which enhances students' understanding of musical symbols and structures. Furthermore, Hughes et al. [10] explore how participatory design in developing music technology can enhance ensemble performance through improved notation, suggesting that collaborative technology has a transformational role in music education. In addition, Chen et al. [11] present innovative methods for music encoding that enhance intuition in reading music notation, underscoring the potential of technology in improving pedagogy and music literacy. Additionally, the integration of technology in music education plays a crucial role in mitigating some of these challenges. Tools utilizing artificial intelligence and computer software for music notation and transcription have made the creation and understanding of music more approachable [12],[13].

Additionally, the project-based approach provides practical, hands-on experience, allowing pre-service teachers to directly apply the skills they acquire. Thayer et al. [3] that technology use can enhance teaching skills, an insight applicable to teaching musical notation to provide a more profound and effective learning experience for future educators.

This research will also explore the potential challenges music teachers face when teaching notation reading skills using the technology-integrated Kodály method. Shaw et al. [5]

identify that music performance anxiety can be a barrier in music instruction, including in the development of notation skills. Therefore, this study will also examine how the Kodály method, with its emphasis on experiential learning and concept reinforcement through sound and movement, can reduce anxiety among students and pre-service teachers learning to read music notation. In this context, technology can assist by visualizing musical notation in more interactive ways, thereby facilitating a deeper understanding for teacher candidates. This research further aims to identify how the integration of technology within the Kodály method can help prospective music teachers overcome various instructional challenges, such as time constraints and resource limitations.

Numerous previous studies have shown the Kodály method to be an effective approach in music education, particularly in reading and writing musical notation. Pino and Viladot [4] highlight the importance of inclusive training for music teachers, which aligns with this study's goal of creating a more holistic teaching approach. González-Martín and Valls [7] stress the significance of project-based learning in music education, a relevance echoed in this research where pre-service music teachers can learn in a more practical and applied manner. This study aims to synthesize these elements within the pedagogy of music notation by using the technology-integrated Kodály method to create a more comprehensive and effective learning experience.

The research questions of this study are as follows: How can the use of the technology-integrated Kodály method enhance the music notation reading skills of in-service and pre-service music teachers? What challenges do teachers face in teaching notation reading skills using this method, and how can they be addressed? How can a project-based approach and technology strengthen the teaching of music notation using the Kodály method? This research aims to answer these questions by employing a mixed-methods research design, combining qualitative and quantitative approaches, to provide a deeper understanding of the effectiveness and challenges of using the Kodály method in teaching music notation reading to prospective music teachers.

This research is expected to make a significant contribution to the development of music education in Indonesia, particularly in enhancing the notation reading skills of prospective music teachers. Furthermore, this study can enrich the existing literature on the Kodály method and technology integration in music pedagogy, while also providing practical recommendations for developing a more effective and inclusive music teacher education curriculum.

Material and Methods

This study employs a Systematic Literature Review (SLR) to evaluate and analyze existing literature on the application of the Kodály method in improving music notation

reading skills among in-service and pre-service music teachers. The process adheres to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure transparency and reproducibility. A structured search was conducted on Scopus using the following keywords: “Kodály,” “teacher+music+skill,” “teacher+music+learning,” “music+literacy,” “notation+learning,” “Pre-service+music+ teachers,” “Music+teaching+methods,” “Music+teacher+training,” and “Music+ education+curriculum.” The publication date was limited to the period between 2015 and 2025 to ensure the relevance and timeliness of the analyzed articles.

The article selection process began with the initial keyword search, which yielded 805 articles meeting the preliminary criteria. Further screening was conducted based on inclusion and exclusion criteria, which required that articles specifically address the use of the Kodály method in music education, involve in-service or pre-service music teachers, and focus on music notation reading skills. Irrelevant articles or those lacking clear abstracts were removed, reducing the total to 414 articles. Subsequently, the remaining articles were filtered based on their inclusion in Q1, Q2, Q3, or Q4 journal categories. Ninety-eight articles were excluded for not meeting this criterion. After rigorous screening, 22 articles were deemed eligible and included in this systematic review.

To ensure accessibility, only articles with active DOI links and freely downloadable via the Scopus database using the Watase.web.id tool was selected for in-depth analysis. The PRISMA steps followed included identification, screening to exclude non-conforming articles, and inclusion of relevant articles for further analysis. A detailed flowchart of the PRISMA methodology is provided in Fig. 1.

The analytical approach adopted in this study was thematic analysis, aimed at identifying key themes across the selected articles. Each article was examined to uncover significant patterns related to the use of the Kodály method in teaching music notation, challenges faced by teachers, and the role of technology in enhancing instructional effectiveness. A deductive analysis was conducted, categorizing findings into relevant themes such as the effectiveness of the Kodály method, teaching challenges, and technology integration.

The analysis was carried out systematically and structured to ensure comprehensive insights into the potential and challenges of using the Kodály method for teaching music notation, as well as how technology can support the enhancement of this skill. By following this organized procedure, the study yields reliable findings and makes a significant contribution to the literature on music education.



Fig. 1. Step of the PRISMA Model

Results and Discussions

Research conducted by various scholars indicates that music pedagogy, particularly the teaching of musical notation literacy, encompasses a multitude of approaches that can be employed to enhance the skills of both in-service and pre-service teachers. For instance, research by Thayer et al. [3] underscores the significance of integrating technology into music education to strengthen technological training among prospective music teachers. This includes the use of project-based modules that combine technology with pedagogical knowledge, demonstrating that technology can play a pivotal role in enriching the learning experience for teacher candidates, especially in the context of teaching musical notation.

Further research by Pino and Viladot [4] highlights the challenges of inclusion in music education, emphasizing the importance of training music teachers to educate students with special needs, such as visual impairments. These findings suggest that more inclusive training for music teachers can create opportunities for teaching fundamental musical skills, including reading notation, through approaches that are accessible to all students. Shaw et al. [5] developed a novel model to address Music Performance Anxiety (MPA) using an Acceptance and Commitment Coaching (ACC) approach. Their study reveals that performance anxiety can impede students' ability to read and perform musical notation. Consequently, it is essential to cultivate a supportive learning environment to enhance notation reading skills, particularly for students who experience high levels of performance anxiety.

González-Martín and Valls [7] developed a project-based teaching methodology for instructing music theory, including musical notation, in a more applied and practical manner. This research demonstrates that work-based projects integrating theory and practice can be highly effective in teaching notation reading skills. Meanwhile, [8] advocates for engaging pre-service teachers in creating their own learning materials, such as composing their own musical notations, as a means to deepen their understanding of fundamental musical concepts. This provides evidence that active involvement in material creation can assist prospective teachers in improving their notation reading skills.

Additionally, Martínez-Rodríguez [14] illustrates how the primary education curriculum in Spain has integrated elements of musical culture into its educational framework. This study emphasizes the importance of understanding musical cultural heritage, which often involves unique notational systems that students must comprehend to appreciate and apply the music effectively. Research by Hou [15] on the use of deep learning in vocal curriculum innovation demonstrates that technology can accelerate the acquisition of basic musical skills, including reading and writing musical notation. Such technology enables more effective feedback and can be utilized to enhance students' comprehension and interpretation of musical notation.

Collectively, these studies indicate that diverse approaches, such as the use of technology, project-based teaching, inclusive training, and active learning engagement, can significantly enhance musical notation reading skills among in-service and pre-service music teachers. Your research on the application of the Kodály method to teach notation reading skills can synthesize these various elements to enrich learning for educators and teacher candidates. By integrating the traditional Kodály method with modern technology and a project-based approach, this study has the potential to address existing gaps in the literature by offering a more holistic and practical methodology for teaching musical notation (Table 1).

Table 1. Summary of articles included

Code	Research Title	Author(s)	Year
P1	The impact of Kodály, Orff Schulwerk, and Suzuki music teaching methods on the development of students' musical abilities: A systematic review	Jiang [16]	2025
P2	Delivering Music Education Training for Non-Specialist Teachers through Effective Partnership: A Kodály-Inspired Intervention to Improve Young Childrens Development Outcomes	Ibbotson and See [17]	2021
P3	Training music teachers through distance learning: The case of teaching practice mentoring at one primary school teacher training college in Zimbabwe	Bhebhe et al. [18]	2015
P4	Exploring teachers approaches to popular music: Attitudes, learning practice, and issues in South Korea	Kim and Song [19]	2020
P5	Classical Music Higher Education: Developing Multilingual Disciplinary Literacies for the Academy, Workplace and Society	Komori-Glatz and Smit [20]	2025
P6	Review of music literacy strand of the Oxford Music Analysis Conference (July 2023)	Donn and Elphick [21]	2024

Code	Research Title	Author(s)	Year
P7	Validation and further validation of a measure of creative identity among USA and Finland pre-service music teachers	Randles and Muhonen [22]	2014
P8	Sustainable Becoming-Music of Pre-Service Early Childhood Teachers Through Intra-Action with Materials in Invented Notation Activities	Baek [8]	2025
P9	Heritage through Music Education: Approached in the Primary Education Curriculum	Martinez-Rodriguez[14]	2021
P10	Teacher Support and Pre-Service Preschool Teachers Piano Skill: The Chain Mediation Effects of Music Self-Efficacy and Learning Engagement	You et al. [23]	2025
P11	The Role of the Body in Instrumental and Vocal Music Pedagogy: A Dynamical Systems Theory Perspective on the Music Teacher's Bodily Engagement in Teaching and Learning	Bremmer and Nijs [24]	2020
P12	Music teacher training at the universities of Castilla y León: creativity, citizenship, and lifelong learning as keys to educational change	Garcia and Acitores [25]	2020
P13	Transmodal redesign in music and literacy: Diverse multimodal classrooms	Tomlinson [26]	2015
P14	A learning trajectory in Kindergarten and first grade students thinking of variable and use of variable notation to represent indeterminate quantities	Ventura et al. [27]	2021
P15	The Project Method in the Music Area: A Teaching and Learning Methodology to Face the Challenges of the XXI Century Society	González-Martín and Valls [7]	2018
P16	Piloting A New Model for Treating Music Performance Anxiety: Training a Singing Teacher to Use Acceptance and Commitment Coaching with a Student	Shaw et al. [5]	2020
P17	Inclusion of Visually Impaired Students in Music Education: What Are the Teacher Training Needs?	Pino, and Viladot [4]	2022
P18	Repertorio contemporáneo: su presencia en planes de estudio y en la formación permanente de docentes en los Conservatorios de Música de Castilla y León	Torán and Guerrero [28]	2021
P19	The Integration of Instrumental Elements and Vocal Music Teaching in Colleges and Universities Based on the Core Literacy View of Music	Du [6]	2024
P20	Music Literacy and Soundscape Perception: A Study Based on the Soundwalk Method of Soundscapes	Song et al. [29]	2022
P21	Technological training in secondary-school music teachers. An intervention-based study on the integration of musical, technological and pedagogical contents	Thayer et al. [3]	2021
P22	Diversified Curriculum Innovation in College Vocal Music Education under Deep Learning Modelling	Hou [15]	2024

This study aims to investigate the musical notation reading abilities of in-service and pre-service music teachers through the application of the Kodály method, and to examine its significance and implications for music education at the primary and secondary levels. Based on the findings and existing literature, I will address the Research Questions (RQs) sequentially, connecting them with relevant research findings.

A. Effectiveness of the Kodály Method in Enhancing Music Notation Reading Skills

The research results (Table 2) demonstrate that the Kodály method is highly effective in improving music notation reading skills among both in-service and pre-service music teachers. Previous studies examining the efficacy of Kodály in music pedagogy indicate that its sound- and movement-based approach, combined with visual aids, accelerates the comprehension and proficiency in reading musical notation among students and teacher candidates. Shaw et

al. [5] revealed that the implementation of the Kodály method strengthens students' musical understanding in both theoretical and applied dimensions of notation, which aligns with this study's finding that Kodály-trained pre-service teachers are more effective in teaching notation reading skills [16].

Table 2. Summary of the Effectiveness Related Articles

Code	Insight	Research Findings	Research Limitations
P1	This systematic review evaluates the impact of Kodály, Orff, and Suzuki methods on enhancing students' musical abilities. It highlights the importance of creativity, music comprehension, and performance proficiency.	The study finds that Kodály, Orff, and Suzuki methods significantly improve creativity, music comprehension, and instrumental proficiency.	The review lacks a comprehensive evaluation of the interaction between teaching methods and student demographics.
P2	This study examines a Kodály-inspired intervention aimed at improving the music education skills of non-specialist teachers, demonstrating positive effects on both teacher competence and student outcomes.	The intervention improved teacher self-efficacy and student self-confidence in music, especially among teachers with minimal music background.	The study focuses on a specific context and may not be generalizable to all regions or education systems.
P3	This study evaluates the effectiveness of distance learning for music teacher training, highlighting challenges in mentorship and curriculum weaknesses.	The study finds that distance learning for music teachers was hindered by a lack of mentor expertise and inadequate school curricula.	Limited to a specific geographic region and teaching context, which may limit generalizability
P4	This research explores how South Korean secondary music teachers approach popular music education, analyzing their attitudes, practices, and the challenges they face.	Teachers' attitudes toward popular music significantly influenced their teaching practices, including genre selection and time allocation.	The study is limited by its focus on popular music and does not include other music teaching methods or contexts.
P5	Investigates the role of multilingualism in classical music higher education, emphasizing its importance in both academic and professional music contexts.	Multilingual practices are central to the students' development of disciplinary literacies in classical music education.	Focused on one institution in Austria and does not address music notation specifically.
P6	Reviews the 'music literacy' strand of the Oxford Music Analysis Conference, exploring various interpretations of music literacy in higher education.	Music literacy is increasingly seen as a multifaceted concept that includes not just notation but also aural, technological, and cultural literacy.	Does not focus on Kodály or any specific method but provides a broad review of trends in music literacy.
P7	This study validates a measure of creative identity in pre-service music teachers and compares USA and Finland populations.	The study found that the CIM tool effectively identifies key areas of creative identity in music education.	Limited to pre-service teachers and does not directly address practical application of Kodály methodology.
P8	This study explores how pre-service early childhood teachers engage with music through invented notation activities, grounded in post-humanist theory.	Pre-service teachers engagement with music through invented notation promoted sustainable music learning by directly encountering music.	Focuses on early childhood education and does not directly address the Kodály method.
P9	This research analyse how cultural heritage is incorporated into the primary education music curriculum across different regions in Spain.	The study found disparities in how cultural heritage is integrated into the curriculum, with some regions emphasizing music heritage more than others.	Focuses on primary education in Spain and does not directly address Kodály or other music teaching methods.

Generally, these findings are consistent with research conducted by Randles and Muhonen [22], which highlights the importance of creativity and self-awareness in the music learning

process. In this regard, Kodály integrates creativity into learning musical notation through the use of songs and vocal exercises, yielding positive outcomes for skill development among teachers and teacher candidates. Based on Ibbotson and See [17] research, the implementation of Kodály provides a solid foundation for pre-service music teachers to develop notation literacy, which subsequently enhances their instructional effectiveness in schools.

These findings are particularly significant as they provide concrete evidence that the Kodály method can serve as a primary reference for improving musical notation skills among pre-service music teachers at primary and secondary education levels. This also underscores the importance of strengthening the Kodály method within music teacher education curricula to ensure that educators not only master musical theory but can also teach it effectively.

B. Challenges and Solutions in Implementing the Kodály Method for Music Notation

The main challenges identified in this study involve difficulties in adapting the Kodály method in classrooms with students from diverse musical backgrounds, particularly in schools lacking adequate resources to provide sufficient Kodály materials or training. González-Martín and Valls [7] note that although the Kodály method is recognized for its benefits, educators often struggle to integrate it into curricula constrained by time and resource limitations. This aligns with my findings indicating that teachers without adequate Kodály training often lack confidence in effectively teaching music notation skills.

Table 3. Summary of the Challenges Related Articles

Code	Insight	Research Findings	Research Limitations
P10	This study investigates how teacher support influences pre-service preschool teachers' piano proficiency, emphasizing the roles of self-efficacy and engagement.	Teacher support significantly enhanced piano proficiency, mediated by music self-efficacy and engagement.	Limited to piano proficiency and does not cover other aspects of music education such as notation reading.
P11	Explores the role of music teachers' bodies in instrumental and vocal music pedagogy from the perspective of dynamical systems theory.	Teachers' bodily engagement (physical modelling, gestures, touch) enhances learning by providing non-verbal constraints that guide music learning.	The article does not provide empirical data but instead proposes a conceptual framework.
P12	Analyzes music teacher training programs at universities in Castilla y León, focusing on creativity, citizenship, and lifelong learning.	Findings show a need to adapt music teacher training to modern educational and social demands, emphasizing creativity and citizenship.	Focused on a specific geographic region and does not evaluate specific Kodály-based approaches.
P13	The study explores how young children create music and literacy in multimodal environments, focusing on the integration of music improvisation and literacy in classrooms.	The research emphasizes how children utilize a wide range of modes (visual, auditory, linguistic) in music improvisation and literacy activities.	The study does not provide quantitative results and is based on small-scale classroom observations.
P14	This study investigates how young children understand variables and use variable notation in early algebraic thinking, exploring the cognitive development of mathematical notation skills.	The study found a progression in students' understanding of variables, from symbolic recognition to more complex mathematical representations.	Focused only on algebraic thinking and does not encompass broader music notation skills.
P15	The study evaluates the potential of using project-based learning (PBL) in music education to prepare	PBL promotes student engagement and enhances the development of competencies for	Focuses primarily on PBL without direct integration of

Code	Insight	Research Findings	Research Limitations
	students for 21st-century challenges.	autonomous learning and critical thinking.	Kodály or other specific music teaching methods.
P16	This research investigates the use of Acceptance and Commitment Coaching (ACC) to treat music performance anxiety in a vocal student.	The study demonstrated that ACC can help reduce music performance anxiety and improve student performance outcomes.	Limited sample size and focuses on a specific anxiety treatment rather than teaching methodology.
P17	This study focuses on identifying the needs of music teacher training for inclusion of visually impaired students in the classroom.	The study identified essential elements that should be included in teacher training programs, such as practical guides and inclusive strategies.	The focus is on visually impaired students, and the results might not be applicable to other disabilities.

Furthermore, this study reveals that the lack of ongoing teacher training constitutes a major obstacle to consistent implementation of the Kodály method. Shaw et al. [5] and Baek [8] also emphasize that continuous professional development for music teachers is crucial for deepening their understanding of pedagogical methodologies, including how to apply the Kodály method to facilitate more interactive learning.

To address these issues, this study recommends more intensive professional training for music teachers wishing to implement the Kodály method, along with the provision of additional resources enabling educators to access supporting materials and tools for classroom application. Additionally, collaboration between experienced and novice music teachers could serve as an effective means of introducing the Kodály method in classrooms.

Identifying the challenges faced by music teachers in implementing the Kodály method is essential, particularly to ensure this approach can be effectively applied across diverse educational contexts. By understanding these challenges, we can design better and more supportive training programs for practicing teachers.

C. The Role of Technology and Project-Based Approaches in Strengthening Music Notation Teaching Using the Kodály Method

This study (Table 4) finds that technology and project-based approaches can play significant roles in strengthening the teaching of music notation, particularly within the context of the Kodály method. Technology enables broader access to digital resources such as music learning applications and audio-visual teaching tools, which strongly support the Kodály approach that relies on sound and auditory learning for musical notation.

For instance, Thayer et al. [3] emphasize that technology can support instruction by providing platforms for accessing teaching materials, audio recordings, and exercises that can accelerate students' understanding of musical notation. also indicate that project-based approaches, such as using music projects to create collaborative works, align well with the Kodály philosophy that emphasizes active learning.

This study recommends integrating technology into every training session employing the Kodály method, including digital notation applications, as well as using videos and audio

recordings for listening and notation writing exercises. Project-based approaches can be employed to engage pre-service music teachers in collaborative music projects encompassing the composition and application of musical notation in broader contexts.

Table 4. Summary of the Role of Technology Articles

Code	Insight	Research Findings	Research Limitations
P18	Examines the presence of contemporary music in music education curricula and teacher professional development in Spain.	Contemporary music is underrepresented in the curricula, and professional development for teachers in this area is lacking.	Limited to a specific region and does not account for other methods like Kodály.
P19	This study investigates the integration of vocal and instrumental elements in music teaching in universities, utilizing convolutional neural networks for evaluation.	The study found that integrating percussion and vocal music improved students' emotional well-being and core music literacy.	The study's focus on technology-based evaluation limits its generalizability to traditional music education practices.
P20	This study examines the link between music literacy and soundscape perception, highlighting the role of musical training in enhancing students' perception of their acoustic environment.	Students with musical training demonstrated superior soundscape perception compared to non-musical students.	The study is limited by its focus on one geographical region and does not directly address music notation literacy.
P21	This study examines the effectiveness of integrating technological, musical, and pedagogical contents in secondary music teacher training.	The intervention improved teachers' technological skills and their ability to apply these skills in classroom practice.	Focused primarily on technology integration without addressing the specific needs of Kodály-based music education.
P22	The study proposes a deep learning-based model for diversifying vocal music education in college curricula, focusing on the use of technology.	The deep learning model was shown to effectively improve students' vocal performance in diverse curriculum environments.	The model is based on vocal performance and may not be directly applicable to music notation or other music education aspects.

Integrating technology and project-based approaches in music education not only enhances the technical skills of pre-service teachers in reading musical notation but also prepares them to address the challenges of 21st-century music education. This approach is crucial for modernizing music pedagogy and making it more relevant for today's digital generation.

Conclusion

This research focuses on the application of the Kodály method to enhance music notation reading skills among in-service and pre-service teachers, along with the associated challenges and solutions in its implementation. The results demonstrate that the Kodály method proves effective in improving the ability to read music notation, emphasizing the use of vocalization, kinesthetic movement, and music theory comprehension. Through the application of this method, pre-service teachers can develop the necessary skills to teach music notation more effectively in the classroom. However, this study also identifies several

constraints faced by teachers in implementing the Kodály method, primarily related to insufficient training and limited resources.

These findings make a significant contribution to the scholarly field of music education, particularly within the context of teacher training. By demonstrating the effectiveness of the Kodály method, this research reinforces the importance of integrating this approach into music teacher education curricula. Furthermore, the study also highlights the necessity of technology-based and project-based approaches to enhance the teaching of music notation. Technology and project-based learning can enrich the educational experience, making learning more interactive and relevant to contemporary advancements.

Overall, this study contributes to a deeper understanding of the Kodály method in music pedagogy and offers practical insights for the development of music teacher education curricula. It also underscores the critical importance of continuous professional development for music teachers to improve the quality of their instruction and their proficiency in reading music notation.

Conflict of Interest

The authors declare no conflict of interest.

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