A Study on Primary School Music Notation Teaching from the Interdisciplinary Perspective of "Music-Mathematics"

Jin Tian

Xi'an Weiyang District Kaiyuan Primary School , Weiyang Xi'an, 710000

Abstract: This paper explores primary school music notation teaching from the interdisciplinary perspective of "music-mathematics." The purpose is to examine how mathematical thinking can help students understand rhythm, pitch, musical structure, and related concepts. Through theoretical analysis and discussion of teaching practice, the study finds that mathematical concepts such as counting, fractions, proportion, sequence, and spatial relationships can make abstract musical scores easier for students to understand. The research concludes that the integration of music and mathematics can not only improve students' ability to read musical notation, but also enhance classroom participation and promote the coordinated development of artistic perception and logical thinking ability.

Keywords: integration of music and mathematics; primary school music education; music notation teaching; interdisciplinary teaching; cultivation of musical literacy

DOI:10.12417/3029-2328.26.05.003

Introduction

With the advancement of curriculum reform, interdisciplinary teaching has become an important direction in basic education. Music notation teaching is a fundamental part of music education, but many students still find it difficult to understand notes, rhythm, beat, and pitch symbols. Mathematics emphasizes order, quantity, proportion, and logic, which are closely related to music notation teaching. Therefore, integrating mathematical thinking into notation teaching can help students transform abstract symbols into clear and meaningful knowledge. From the perspective of "music-mathematics," this paper explores the theoretical foundation, teaching value, existing problems, practical strategies, and development paths of music notation teaching, aiming to provide reference for improving the quality of primary school music education.

1.The Theoretical Foundation of "Music-Mathematics" Interdisciplinary Music Notation Teaching

Music and mathematics seem to belong to two different fields: artistic aesthetics and rational cognition. However, they are naturally connected in terms of rhythmic order, structural proportion, symbolic systems, and logical relationships. Music is an art form that uses sound as its medium and time as its carrier, while mathematics studies quantitative relationships and spatial forms. In primary school music notation teaching, note values, beat organization, melodic direction, pitch arrangement, and phrase structure are not merely musical symbols that need to be memorized. Instead, they contain relatively clear mathematical logic. Taking rhythm learning as an example, whole notes, half notes, quarter notes, and eighth notes all reflect clear fractional relationships. Measures, time signatures, and strong-weak beat patterns also reflect the organization of musical time under specific rules. Therefore, introducing mathematical thinking into music notation teaching is not an external addition to the subject content, but a process of exploring the quantitative, proportional, sequential, and structural rules contained in musical knowledge itself.

From the perspective of pupils' cognitive development, lower- and middle-grade students are still gradually developing their ability to understand abstract symbols. Intuitive experience, physical participation, and situational perception remain important ways for them to acquire knowledge. If teachers rely only on conceptual explanation and mechanical memorization in music notation teaching, students may remain at the superficial level of

This article is a phased achievement of the 2025 annual project of the "14th Five-Year Plan" Education Science Planning of Shaanxi Province, titled "Research on Primary School Music Notation Teaching Oriented by Core Literacy - Taking the Interdisciplinary Integration of 'Music - Mathematics' as the Practical Path". Project Approval Number: SGH25Y0548.

"recognizing the names of symbols" and fail to truly understand the internal connections between notes and sounds, beats and note values, melodies and pitch. Mathematical concepts such as counting, comparison, equal division, sequencing, and spatial positioning are closely related to students' existing experiences, and therefore can provide cognitive support for understanding musical symbols. If teachers connect note values with fractional relationships, melodic pitch with spatial position, and rhythmic structure with ordered patterns, students can use familiar mathematical experiences to understand unfamiliar musical symbols, thereby reducing the difficulty of learning musical notation.

Constructivist learning theory holds that students do not acquire knowledge by passively receiving external information, but actively construct meaning based on prior experience through association, comparison, operation, and reflection. "Music-mathematics" interdisciplinary notation teaching conforms to this theoretical logic. It neither requires students to simply memorize how many beats a note represents, nor asks them to recite staff notation or numbered musical notation rules in isolation. Instead, this teaching approach guides students to establish knowledge connections through comprehensive activities such as observation, listening, singing, movement, calculation, and thinking. Through clapping, stepping, drawing, arranging rhythm cards, and observing melodic direction, students can integrate sound perception, symbol recognition, physical experience, and logical reasoning. In this way, music notation teaching shifts from one-way instruction to meaningful knowledge construction. The theory of multiple intelligences also points out that students possess different strengths in musical perception, logical reasoning, bodily movement, and spatial observation. Interdisciplinary teaching can provide diverse learning paths for different types of students, thereby supporting the development of students' comprehensive literacy.

2.The Educational Value of Integrating Mathematics into Primary School Music Notation Teaching

2.1 Helping Students Deepen Their Understanding of Rhythm

Rhythm is a core component of primary school music notation teaching and also one of the most challenging areas in students' learning process. Many students can imitate the teacher's rhythm, but they may not truly understand why different notes have different durations, nor can they clearly explain why several short-value notes can combine to form a complete measure. Introducing mathematical thinking helps students move from "auditory imitation" to "structured understanding." In teaching, teachers can regard a measure as a complete unit of musical time, a whole note as a complete unit of duration, and half notes, quarter notes, and eighth notes as parts formed by dividing this complete unit into two, four, and eight equal parts. Through this explanation combining fractions and proportion, students can more clearly grasp the corresponding relationships among different note values and understand that musical rhythm is not a random combination, but an ordered structure formed according to specific beat and duration rules.

Counting also plays an important role in rhythm learning. When students clap, step, tap, or read rhythms aloud, they can feel the flow of musical time through stable counting such as "one, two, three, four." Teachers can also guide students to compare the total number of beats in different rhythmic patterns, judge whether a measure is complete, or combine multiple rhythm cards into rhythmic phrases that meet the required number of beats. In this way, students deepen their understanding of the relationships among beat, note value, and measure through practical operation. At this point, mathematics does not replace music. On the contrary, it helps students transform auditory perception into structured cognition that can be observed, compared, and verified.

2.2 Help students improve their understanding of pitch

Primary school music notation teaching includes not only rhythmic reading, but also pitch recognition and melodic understanding. Whether using staff notation or numbered musical notation, students need to understand the pitch, interval, and order of notes. Staff notation expresses pitch through the vertical position of notes on lines and spaces, while numbered musical notation reflects relative pitch through numerical arrangement, register marks, and

other symbols. These contents are closely related to spatial orientation, sequential relationships, and graphic observation ability in mathematics. Therefore, introducing spatial thinking and visual methods into pitch teaching can help students transform abstract sound concepts into visual objects that are easier to understand.

Teachers can use arrows, ladder diagrams, straight lines, curves, and coordinate-style charts to guide students in observing whether a melody moves upward, downward, horizontally, or in a wave-like pattern. When students see a melodic line moving upward, they can associate it with gradually rising sound. When they see a curve moving downward, they can perceive that the melody is gradually descending. These visual cues help students form preliminary judgments before singing, thereby reducing the difficulty caused by relying solely on auditory memory. At the same time, teachers can guide students to identify repetition, sequence, contrast, and variation in melodies, helping them understand that musical melodies also follow certain rules, orders, and structures. When students can understand melodies from the two dimensions of spatial position and pattern change, their ability to read musical notation and memorize melodies will gradually improve.

2.3 Helping Cultivate Students' Comprehensive Thinking Ability and Interest in Music Learning

The value of "music-mathematics" interdisciplinary notation teaching lies not only in improving the efficiency of music notation reading, but also in promoting the coordinated development of students' artistic perception and logical thinking ability. Music emphasizes emotional experience, aesthetic expression, and creative imagination, while mathematics emphasizes rule awareness, analytical judgment, and logical reasoning. The integration of the two enables students not only to feel the beauty of sound in musical activities, but also to understand the beauty of order behind musical symbols. Students perceive proportion through rhythmic division, understand spatial relationships through melodic direction, and discover patterns through phrase structure. In this process, they not only develop music notation reading ability, but also acquire the ability to observe comprehensively, compare and analyze, and express themselves creatively.

Meanwhile, interdisciplinary teaching can effectively improve the relatively dull nature of traditional music notation teaching. If notation classes are long limited to teacher explanation, student repetition, and mechanical memorization, students can easily feel difficulties and even regard notation as an abstract task disconnected from musical expression. In contrast, when teachers design interactive activities such as rhythm games, note puzzles, time signature challenges, melodic route maps, and body movement exercises, students can master notation knowledge through participation, cooperation, and exploration. For primary school students, activity-based, situational, and game-based learning methods can not only enhance classroom attraction, but also help students build confidence through successful experiences and gradually develop a positive attitude toward learning music notation.

3.Major Problems in Primary School Music Notation Teaching

3.1 Relatively Insufficient Awareness of Interdisciplinary Teaching

Current curriculum reform continues to emphasize subject integration and core literacy orientation. However, in some primary school music classrooms, teachers are still accustomed to treating music and mathematics as completely independent subjects. In music notation teaching, teachers often focus on song singing, symbol recognition, and rhythm imitation, while paying less attention to the mathematical elements contained in beat, note value, pitch, and melodic structure. As a result, although students may be able to name certain notes or complete rhythm exercises under the teacher's guidance, they often lack sufficient understanding of the time-value relationships among notes, the beat structure within measures, and the rules of pitch changes in melodies. In this way, music notation learning easily remains at the level of surface memorization.

Some teachers also worry that the involvement of mathematics may weaken the aesthetic nature of music classes. They mistakenly believe that interdisciplinary teaching means turning music classes into mathematics classes. In fact, the integration of "music-mathematics" does not replace musical experience with mathematical knowledge, but uses the clarity and structure of mathematics to help students better understand music. Mathematics

should serve as an auxiliary tool in notation teaching, supporting students' rhythmic perception, melodic understanding, and musical expression. Only when teachers correctly understand this integration concept can they combine perceptual experience with rational analysis in curriculum design, enabling students not only to listen to and sing music, but also to read and understand music.

3.2 Relatively Single Symbol Teaching Methods

In some primary school music classrooms, music notation teaching still mainly relies on teacher demonstration, repeated student practice, and repeated singing training. Although this method can help students memorize some symbols in the short term, it is not conducive to forming deep understanding or cultivating the ability to read notation independently. Primary school students have limited attention spans and are prone to fatigue when facing monotonous and repetitive learning methods. If the classroom lacks practical operation, teamwork, game activities, exploratory learning, and performance links, students may remain in a passive state of acceptance, and their interest in notation learning may gradually weaken.

Interdisciplinary notation teaching requires teachers to design richer forms of classroom activities, such as clapping and counting, body movement, rhythm arrangement, graphic observation, group creation, and melodic line drawing. Through these activities, students can experience rhythm through physical participation, understand pitch through visual presentation, and complete knowledge construction through cooperation and communication. If teaching remains limited to the traditional model of "teacher explanation—student memorization—whole-class singing," students will find it difficult to truly understand the connection between musical symbols and sound practice, and they will also find it difficult to transform mathematical thinking into music notation reading ability.

4.Implementation Conditions and Development Directions

To effectively implement "music-mathematics" interdisciplinary notation teaching, teachers must first possess strong interdisciplinary awareness and teaching integration ability. Music teachers should understand basic mathematical concepts related to rhythm, proportion, sequence, and space, while mathematics teachers can provide methodological support for music classrooms. Schools can promote collaborative design between music and mathematics teachers through collective lesson preparation, interdisciplinary teaching research, and lesson plan case discussions, so that music notation teaching can develop from single-subject experience into comprehensive educational practice.

Second, teaching resources need to be further enriched. Rhythm cards, melodic diagrams, visualized courseware, digital music software, and classroom percussion instruments can all make notation learning more intuitive, vivid, and easy to operate. However, the use of resources must serve teaching objectives. Technological display should not replace students' practical experience, and mathematical training should not weaken the aesthetic connotation of music. Teachers should select appropriate resources according to teaching content, ensuring that these resources truly help students understand notes, beats, melodies, and musical structures.

Third, assessment methods need to be improved accordingly. Traditional music assessment often focuses on whether students can sing accurately and recognize notation symbols, while interdisciplinary notation teaching should also pay attention to students' rhythmic understanding, pitch perception, classroom participation, cooperative performance ability, creativity, and knowledge transfer ability. Teachers can combine process assessment with outcome assessment and comprehensively understand students' development through classroom observation, work presentation, rhythm creation, singing performance, and self-reflection. Future research can further explore the long-term impact of "music-mathematics" integration on students' musical literacy, logical thinking, and learning interest, and continuously develop systematic teaching resources and assessment standards to provide more stable support for improving the quality of primary school music education.

5.Conclusion

Primary school music notation teaching is an important component of music education and a key path for students to move gradually from perceptual listening and singing toward independent understanding of music. From the interdisciplinary perspective of "music-mathematics," mathematical concepts such as counting, fractions, proportion, sequence, and spatial positioning can effectively help students understand notation knowledge such as rhythm, pitch, and musical structure, transforming notation teaching from mechanical memorization into a meaningful construction process. Practice shows that the integration of music and mathematics not only helps improve students' notation reading ability, but also stimulates their learning interest and promotes the coordinated development of artistic perception and logical thinking ability.

In specific teaching practice, teachers should always adhere to the principle of taking music as the center, reasonably use mathematical methods to explain musical rules, and avoid simply turning music classes into mathematical training. Schools need to strengthen teacher training, improve interdisciplinary teaching research mechanisms, enrich teaching resources, and establish a comprehensive assessment system, so that students can cultivate stable music notation reading ability through listening, singing, movement, observation, thinking, and creation. Through continuous optimization, "music-mathematics" interdisciplinary notation teaching will become an important path for improving the quality and effectiveness of primary school music classrooms, while also laying a more solid foundation for the development of students' core musical literacy.

References:

[1] Gardner,H.Frames of Mind:The Theory of Multiple Intelligences.New York:Basic Books,2011.

[2] Bruner,J.S.The Process of Education.Cambridge:Harvard University Press,1977.

[3] Swanwick,K.Teaching Music Musically.London:Routledge,2016.

[4] Campbell,P.S.Music in Childhood:From Preschool Through the Elementary Grades.Boston:Cengage Learning, 2018.

[5] Elliott,D.J.,&Silverman,M.Music Matters:A Philosophy of Music Education.Oxford:Oxford University Press, 2015.