

# A Multisensory Approach to Teaching Singing Dynamics in Elementary School

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**Abstract.** Elementary school music education plays a crucial role in developing students' musical sensitivity and expressive abilities. However, young learners often struggle to understand abstract musical concepts, such as dynamics in singing. This study aims to examine the effectiveness of a multisensory approach in teaching singing dynamics to second-grade elementary students by incorporating color as a visual representation and body movement as a kinesthetic reinforcement. This research employs a qualitative descriptive method, utilizing observation, and documentation for data collection. The participants consist of second-grade students engaged in singing lessons where colors represent different dynamic levels, and body movements reinforce their understanding. The results indicate that this approach enhances students' comprehension of dynamics, increases their engagement in learning, and strengthens the connection between auditory, visual, and kinesthetic perceptions. The study concludes that integrating color and body movement is an effective pedagogical strategy for improving young learners' understanding of abstract musical concepts, particularly in singing dynamics. These findings suggest that multisensory strategies can be effectively applied by elementary music teachers to support students' expressive vocal development and engagement in classroom singing activities.

**Keywords:** Body Movement; Color Representation; Multisensory Learning; Music Education; Singing Dynamic.

## 1. Introduction

In contemporary education, multisensory learning approaches have gained prominence, particularly in music education for young children (Fan et al., 2024). Engaging multiple senses—such as auditory, visual, and kinesthetic modalities—has been shown to enhance cognitive development and facilitate deeper learning experiences (Marjanen, 2021). For instance, integrating movement into musical activities can help children internalize musical concepts more effectively, as active bodily engagement enhances musical comprehension (Papazachariou-Christoforou, 2022).

The incorporation of color-coded visual aids and movement-based activities in music instruction has been recognized for its potential to improve students' understanding of complex musical elements (Demirel, 2022; Nurraharjo et al., 2022). By associating colors with dynamic variations, educators can provide tangible representations of abstract concepts, making them more accessible to young learners. In addition, movement-based activities reinforce the physical experience of music and support the internalization of dynamic changes through embodied learning processes (Ow et al., 2023; Sinn Ow et al., 2023)

Despite the importance of dynamics as a fundamental expressive element in singing, elementary school students often experience difficulties in understanding and applying dynamic variations appropriately. Classroom observations indicate that many students tend to sing with a relatively uniform volume, demonstrating limited awareness of distinctions between soft, medium, and loud vocal production. This difficulty is largely caused by the abstract nature of dynamic concepts, which are frequently introduced through verbal

explanations or auditory demonstrations alone. Such instructional approaches may not sufficiently align with the cognitive and developmental characteristics of young learners, who generally require concrete, visible, and physical learning experiences to internalize musical concepts effectively (Pang & Kan, 2024; Xie & Li, 2022).

In elementary music classrooms, the lack of engaging instructional strategies for teaching singing dynamics may result in reduced student motivation and limited expressive development. Teachers often encounter situations in which students are able to sing melodies and lyrics accurately but struggle to control vocal intensity expressively during performance. This condition highlights an urgent need for pedagogical approaches that transform abstract musical elements into more tangible and experiential learning forms. Multisensory learning, which integrates visual, kinesthetic, and auditory modalities, has been shown to enhance conceptual understanding and student engagement in music education (Denervaud et al., 2019; Georgieva, 2024). However, empirical studies that specifically examine the combined use of color representation and body movement in teaching singing dynamics at the elementary school level remain limited. Therefore, this study seeks to address this gap by investigating how a multisensory approach can support students' understanding and application of singing dynamics in elementary music learning contexts.

Previous studies cited above on multisensory learning in music education have primarily focused on general musical skills, rhythmic development, instrumental learning, or early childhood musical engagement. Other research has examined the use of color-coded notation or movement-based activities separately to enhance musical understanding. While these studies confirm the positive impact of multisensory strategies on music learning, they tend to emphasize instrumental contexts or broad musical competencies rather than vocal expression.

In contrast, the present study specifically investigates the application of a multisensory approach in teaching singing dynamics at the elementary school level by integrating color representation and body movement simultaneously within classroom singing activities. This study contributes to the existing literature by focusing on vocal dynamics as an expressive musical element and by providing empirical, classroom-based evidence from elementary music instruction. By examining how visual and kinesthetic cues support students' understanding and application of dynamic variations in singing, this research offers a pedagogical perspective that extends previous multisensory music education studies and addresses a gap in research on vocal dynamics learning in elementary school settings.

### **1.1. Problem Statement**

One of the primary challenges in teaching singing dynamics to elementary students is the abstract nature of the concept. Many students find it difficult to differentiate between soft (*piano*) and loud (*forte*) sounds, let alone apply gradual changes such as *crescendo* and *diminuendo*. The lack of engaging and interactive learning tools exacerbates this issue, leading to decreased student motivation and understanding. Conventional methods relying solely on auditory explanations often fail to accommodate students with different learning styles. This study addresses these gaps by integrating color as a visual representation of dynamic levels and body movement as a kinesthetic reinforcement. Investigating this approach is crucial to determining whether multisensory learning can enhance comprehension and engagement in music education.

### **1.2. Related Research**

Several studies have highlighted the benefits of multisensory learning in music education. For example, research indicates that engaging multiple senses can support cognitive development and enhance the learning experience for young children (Aulina et al., 2024; Cosentino, 2021). Additionally, integrating movement into musical activities has been shown to improve musical skills and coordination among primary school students (Flavian, 2024). Furthermore, incorporating music and movement in early childhood education can aid in language learning and cultural awareness (Silva Leão et al., 2024). While these studies provide

valuable insights into multisensory learning, there remains a gap in research specifically focusing on the combined use of color associations and body movement in teaching singing dynamics to elementary students.

### 1.3. Research Objectives

This study aims to explore the effectiveness of a multisensory approach, integrating color associations and body movement, in teaching singing dynamics to second-grade elementary students. The research seeks to understand how these strategies influence students' engagement, comprehension, and retention of dynamic concepts in music. By examining the impact of this approach, the study intends to provide insights that can inform and enhance music education practices for young learners.

## 2. Theoretical Framework

Multisensory learning has been widely recognized as an effective approach in education, particularly in music learning. This approach engages multiple sensory modalities, including auditory, visual, and kinesthetic, to enhance students' cognitive development and understanding of musical concepts (Barrett & Welch, 2023; Mitchell et al., 2024). In the context of elementary music education, integrating visual and kinesthetic elements into singing instruction can facilitate a deeper comprehension of musical dynamics. The multisensory approach allows students to connect abstract musical elements with tangible experiences, improving engagement and retention (Plúas Pérez et al., 2024, Doherty, 2020; Renelle & Jones, 2022).

### 2.1. Visual and Kinesthetic Learning in Music Education

Visual learning strategies, such as color-coded notation, have been explored to determine their impact on students' ability to recognize and apply musical dynamics. Research indicates that while color-coded materials can increase engagement, their effectiveness in improving music reading skills remains inconclusive (Antunes et al., 2024). Nonetheless, the use of visual aids has been linked to enhanced pattern recognition and emotional engagement in music learning (Rauduvaitė & Yao, 2023). Meanwhile, kinesthetic learning, which involves movement-based activities, has been shown to cater to diverse learning styles and foster active participation in musical activities (Dahua Robelly et al., 2024). Studies highlight those kinesthetic strategies, such as gesture-based learning and body movement, help students internalize rhythmic and dynamic variations more effectively (Maitra, 2024).

### 2.2. Multisensory Approaches in Teaching Music

The integration of multisensory activities in music education has been demonstrated to support students' musical development. Singing games and movement-based activities provide learners with a holistic experience, reinforcing their understanding of musical concepts through multiple sensory channels (Cosentino, 2021; Nurjanah et al., 2024). By combining visual and kinesthetic learning, students can develop a more intuitive grasp of dynamic variations in Musical Learning especially for Elementary students (Kramar et al., 2024; Rosati, 2024). However, empirical research on the specific effects of multisensory approaches on vocal dynamics remains limited. This study aims to address this gap by examining how the combination of visual and movement-based strategies influences students' comprehension and application of singing dynamics in elementary school settings.

## 3. Method

### 3.1. Research Design

This study employed an exploratory qualitative descriptive research design to examine the implementation of a multisensory approach in teaching singing dynamics to second-grade elementary students. This design was chosen because it allows for an in-depth exploration of learning processes, classroom interactions, and students' responses to instructional strategies

within a natural educational setting. Rather than testing hypotheses or measuring causal relationships, the qualitative descriptive approach enables a detailed portrayal of how multisensory elements—specifically color representation and body movement—are applied and experienced during singing instruction. This approach is particularly suitable for investigating abstract musical concepts, such as vocal dynamics, which are best understood through direct observation and contextual interpretation of teaching and learning activities.

### 3.2. Participant

The participants in this study were second-grade students from an International Christian elementary school in Bandung, Indonesia. A total of 31 students (17 males and 14 females) participated in the study, with ages ranging from 7 to 8 years old (see Table 1). Using a cluster sampling technique, one out of four available second-grade classes were selected as the sample.

**Table 1.** Participant Demographics

Category	Frequency (n)	Percentage (%)
Male	17	54,8%
Female	14	45,2%
Total	31	100%

The participants were selected using a cluster sampling technique, as the study focused on observing a naturally formed classroom group within the school setting. Second-grade students were chosen because this level represents an important developmental stage in which children begin to develop greater vocal control and expressive awareness in singing. At this stage, students are also cognitively ready to engage with basic musical concepts such as dynamics, while still benefiting from concrete and multisensory learning experiences. The selection of one intact class allowed the researcher to examine authentic classroom interactions and instructional practices without disrupting the regular learning process.

### 3.3. Data Collection

Data were collected through classroom observations, semi-structured interviews, and document analysis. The documents analysed in this study included lesson plans, teaching materials, color-coded song lyrics, students' written assessment results, and audio-visual recordings of classroom activities. Observations were conducted during music lessons to examine how students engaged with color-coded visual aids and movement-based activities in learning vocal dynamics. Semi-structured interviews with students and teachers provided insights into their perceptions of the effectiveness of this multisensory approach. Additionally, lesson plans, student activities, and audio-visual recordings were analyzed to support and cross-check the findings.

### 3.4. Data Analysis

Data analysis was conducted using thematic analysis to identify recurring patterns and themes emerging from the qualitative data. Classroom observations, interview transcripts, and document analysis were first transcribed and organized systematically. The data were then coded inductively by categorizing key aspects related to students' responses to color representation, body movement, and their understanding of singing dynamics. These codes were further refined into broader themes that reflected students' conceptual comprehension, engagement, and expressive application of vocal dynamics. This analytical process allowed for an in-depth interpretation of how multisensory learning strategies supported students' learning experiences in singing dynamics.

### 3.5. Validity and Reliability

To ensure the credibility of the study, multiple validation strategies were applied. Triangulation was used by comparing data from observations, interviews, and document analysis to strengthen reliability. Member checking involved sharing preliminary findings with teachers to verify accuracy, while peer debriefing allowed discussions with fellow researchers to refine

data interpretation and minimize bias. Member checking was conducted with one music teacher and two fellow teachers involved in the learning process to verify the accuracy and credibility of the findings. These strategies enhanced the trustworthiness and dependability of the study.

#### 4. Findings

To address the research objectives of this study, the findings are organized to illustrate how a multisensory approach supports elementary school students' understanding and application of singing dynamics. Specifically, the first objective—to examine students' initial understanding and responses to dynamic concepts in singing—is reflected in the description of students' early reactions and learning processes during classroom activities. The second objective—to explore how visual (colour representation) and kinesthetic (body movement) strategies support students' comprehension and expressive use of vocal dynamics—is addressed through detailed observations of instructional implementation and student performance. The following subsections present the findings systematically, based on classroom observations, teacher interviews, and document analysis.

Based on interviews conducted with music teachers at the research site, the teaching of vocal dynamics is positioned as the second phase in a structured sequence of singing instruction for second-grade elementary students. Prior to this, students were introduced to foundational musical elements, including pitch and rhythm recognition, primarily through simple and familiar songs encountered in their daily environment. In the initial session of the dynamics lesson, students were engaged in a collective singing activity of the song “The Wheels on the Bus,” accompanied by the teacher playing the ukulele to provide harmonic support.

##### 4.1. Student Initial Responses to the Concept of Dynamics

At the beginning of the lesson, the teacher opened the session by greeting the students and reviewing the previous material. Students were actively engaged in recalling prior concepts such as rhythm, pitch, and the titles of songs they had previously sung. The teacher then transitioned to introducing the new topic of vocal dynamics by posing an open question to the class.

A few students, particularly those with a background in private piano lessons, responded enthusiastically and claimed familiarity with the term "dynamics." The teacher further prompted these students to elaborate on their understanding. One student demonstrated how dynamics were applied by pressings piano keys with varying intensities. However, this student had difficulty articulating the conceptual meaning of dynamics in verbal terms. The rest of the students, who lacked prior exposure to formal music instruction, were generally unfamiliar with the concept of dynamics, especially within the context of singing.



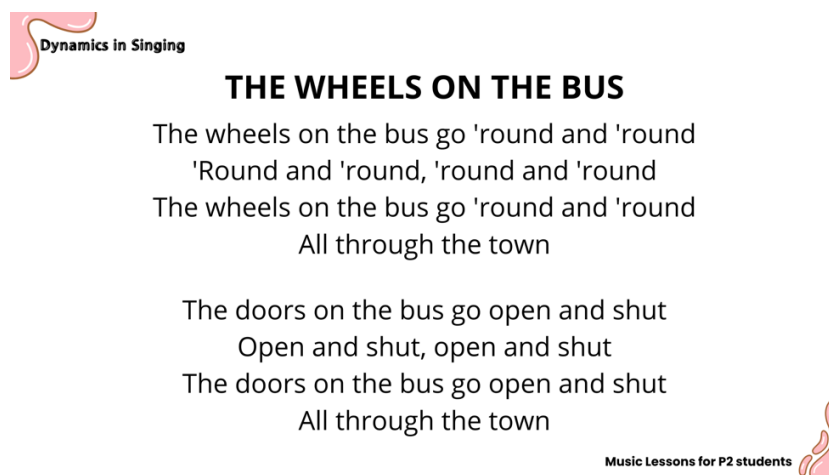
Figure 1. The 1st Slide of Teacher's Presentation

To scaffold understanding, the teacher presented a slide showing three basic dynamic markings: *piano*, *mezzo forte*, and *forte*. Upon viewing the slide, several students pointed out the terms *forte* and *piano* (see Figure 1). One student accurately associated *forte* with loudness and *piano* with softness. However, confusion arose among some students who interpreted *piano* as the musical instrument rather than a dynamic marking. Those with piano lesson experience tended to recognize the term *forte*, while others attempted to infer meanings from the visual cues provided in the illustrations. One student suggested that *piano* represented a whispering sound and *forte* a shouting voice, although the concept of *mezzo forte* remained unclear to most students at this stage.

#### 4.2. Implementation of Visual Strategies: Color Association with Vocal Dynamics

To facilitate students' understanding of dynamic concepts, the teacher intentionally introduced visual illustrations that symbolically represented each dynamic marking. The lesson began with a visual prompt illustrating the term *piano*. The teacher guided the students through a reflective question: "What is the girl in the picture doing?" In unison, the students responded, "Whispering!" Building on this collective response, the teacher encouraged the class to imitate the sound of a whisper. All students enthusiastically engaged, vocalizing in a soft tone. The teacher then directed them to pronounce the word *piano* in a whispering voice, which the students followed with ease.

To reinforce comprehension, the teacher posed a concluding question to the class: "*Piano* is a type of dynamic in singing that indicates what kind of volume?" Without hesitation, the students responded, "Soft." This response indicated their emerging ability to associate the term with its expressive function in singing. Following this conceptual introduction, the teacher presented a familiar song lyric, previously sung at the beginning of the lesson, on a slide. At this stage, the lyrics appeared in standard black text (see Figure 2). When prompted to sing the song again, the students performed with a neutral vocal volume, showing no significant change in expression, which suggested that further intervention was necessary to introduce the color-coded dynamic cues.



**Figure 2.** The Lyrics of "The Wheels on The Bus" Song

Following the conceptual introduction of *piano*, the teacher proceeded by modifying the color of the song lyrics from black to yellow (see Figure 3). Students were instructed to associate the yellow-colored lyrics with the first dynamic level—*piano*. When the class was prompted to sing the same familiar song with this new cue, they collectively adjusted their vocal output, demonstrating a significantly softer volume that reflected their understanding of the *piano* dynamic.



**Figure 3.** The Yellow-Colored Lyric for Piano Dynamic Level

To introduce the second dynamic level, the teacher presented a new slide and posed the same guiding question as before. The illustration accompanying the term *mezzo forte* elicited various student responses; several inferred that it signified speaking in a normal voice. To reinforce this interpretation, the teacher invited a student to model medium-volume speech from their seat, which helped clarify the concept. The same song lyrics were then displayed again, now with portions colored in green. The teacher labeled the green lyrics as indicators for *mezzo forte* (see Figure 4), or singing with a medium/normal vocal volume—louder than piano, but not yet *forte*. In the second verse, the lyrics included a combination of yellow and green, requiring students to alternate between two dynamic levels.



**Figure 4.** The Yellow and Green-Colored Lyrics

The students were generally successful in transitioning between these dynamics, indicating an early adaptability to the multisensory learning cues. Subsequently, the teacher introduced the final dynamic level: *forte*. As the corresponding slide was displayed, students reacted instinctively, many raising their voices to match the visual cue without additional prompting. When asked to define *forte*, students responded in unison, "Singing loudly." To consolidate this understanding, the teacher presented the same song lyrics once more. The first line remained green (*mezzo forte*), while the following lines were now colored red, representing the *forte* dynamic (see Figure 5). Students were reminded that red indicated loud singing. They were then guided to perform the piece again.

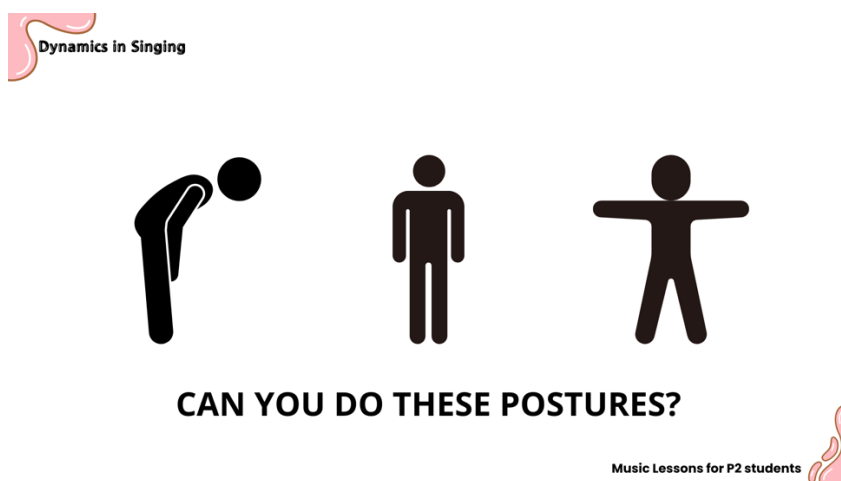


**Figure 5.** The Green and Red-Colored Lyrics

During this stage, an observable challenge emerged: several male students struggled to modulate their vocal output. The sections marked *mezzo forte* were sung with excessive loudness, resembling *forte* dynamics. Conversely, most female students underperformed during the *forte* sections, rendering them nearly indistinguishable from *mezzo forte* passages. This highlighted the need for further reinforcement and individual practice in distinguishing between vocal intensities.

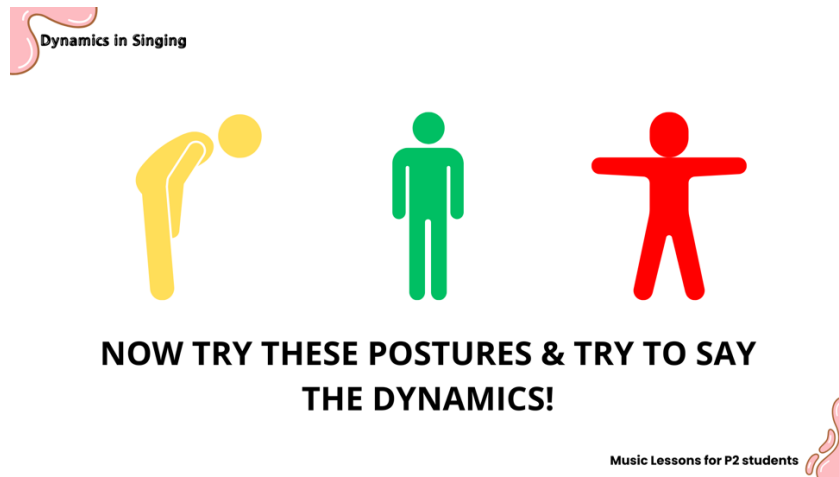
#### 4.3. Integration of Kinesthetic Movement to Express Vocal Dynamics

To deepen students' understanding of vocal dynamics, the teacher introduced a new instructional strategy incorporating kinesthetic movement. Building upon the previously implemented color-coded cues, students were now guided to associate physical gestures and postures with specific dynamic levels. A slide presentation displayed three different body movements corresponding to the dynamics *piano*, *mezzo forte*, and *forte* (see Figure 6).



**Figure 6.** Three Different Body Movements Corresponding to the Dynamics

The first instruction required students to lean their upper body forward approximately 45 degrees while softly articulating the term *piano*, thereby simulating a quiet vocal production. For *mezzo forte*, students stood upright in a neutral posture and spoke the term with a normal voice. Finally, to express *forte*, students extended both arms outward while projecting the term loudly. Each gesture was paired with the color previously associated with the respective dynamic: yellow for *piano*, green for *mezzo forte*, and red for *forte* (see Figure 7). These associations were intended to reinforce multisensory memory through the combination of visual, auditory, and kinesthetic inputs.



**Figure 7.** Three Different Body Movements Paired with Color

Students were invited to practice each posture sequentially, row by row. Throughout the activity, most students were able to follow the instructions accurately. Notably, the distinction between *mezzo forte* and *forte* became more evident during this stage, suggesting improved perceptual differentiation of volume control.

Next, the teacher revisited the previously introduced song lyrics, now displayed in yellow and green to indicate *piano* and *mezzo forte* (see Figure 8). Students were tasked with singing the lyrics using the appropriate dynamic level, aided by both the color cues and the physical gestures they had rehearsed. Each row took turns performing while the others observed and evaluated whether the correct dynamic expression was used. All six student rows successfully performed the task, demonstrating appropriate dynamic control as guided by the visual and kinesthetic cues. To extend the challenge and enhance engagement, the teacher introduced a variation of the same song with more complex dynamic transitions. During the first trial, students encountered minor difficulties managing these shifts. However, during a second attempt, they exhibited increased control and precision in executing the dynamic changes.



**Figure 8.** The Example of More Complex Dynamic Transitions

#### 4.4. Integration of Kinesthetic Movement to Express Vocal Dynamics

As part of the instructional process, the teacher conducted evaluations to assess students' understanding of dynamic concepts in singing following the implementation of the multisensory approach. The evaluations were carried out in two forms: a cognitive assessment using multiple-choice questions and a practical performance assessment involving singing activities with specific dynamic expressions. For the cognitive assessment, students were given

five multiple-choice questions designed to measure their fundamental understanding of dynamic terms such as *piano*, *mezzo forte*, and *forte*, as well as their ability to distinguish dynamics based on color cues and body movement illustrations. A written description of this multiple-choice assessment is presented in Table 2 below.

**Table 2.** Multiple-choice Assessment

Questions	Multiple Choices
1. If a song should be sung softly, which dynamic word do we use?	A. Forte, B. Piano, C. Fast
2. What does the dynamic forte mean?	A. Very soft, B. Normal, C. Loud
3. When the song has to be sung <i>mezzo forte</i> , how should we sing?	A. Soft, B. Medium, C. Very loud
4. What does the yellow color in the song mean?	A. Loud, B. Medium, C. Soft
5. What does the red color in the song tell us to do?	A. Sing softly, B. Sing medium, C. Sing loudly

In the practical evaluation, students were asked to perform a previously learned song by applying the appropriate dynamics, as indicated by the corresponding colors and body movements. While the activity had previously been done in small groups line-by-line, this time each student was asked to come forward and perform individually in front of the class. The teacher conducted direct observation and provided real-time feedback throughout the activity. The outcomes of both evaluations are presented in the following Table 3.

**Table 3.** The Evaluation Results

Name/Initials	Gender	Assessment Score	Practical Score
AMBLG	Female	90	100
ACK	Male	90	100
AKK	Female	90	100
ASC	Female	100	100
BK	Male	85	100
BAH	Male	85	100
CCH	Female	80	100
CJ	Female	80	100
CME	Female	80	100
CDKL	Male	95	100
CST	Male	95	100
DDL	Male	80	100
FHA	Female	95	100
HSB	Male	80	100
JCK	Female	95	100
KCS	Male	80	100
KLK	Female	95	100
MCB	Male	95	100
NJP	Female	100	100
OEY	Male	80	85
OJ	Male	80	100
RRF	Male	80	100
RCR	Male	100	100
ROK	Male	85	100
SMLG	Male	85	100
SVP	Female	85	100
TEW	Female	85	100

TEB	Male	100	100
VMS	Female	100	100
WED	Female	85	100
NBA	Male	80	80

The results indicated that the majority of students were able to answer the questions correctly. The overall learning mastery rate exceeded 85%, indicating that the material had been well understood by most students. Observations during the performance assessment revealed that students had improved their ability to adjust vocal volume in accordance with dynamic markings. In general, there was a significant improvement in the accurate application of dynamics compared to the period before the multisensory intervention. Although a few students still encountered minor difficulties—such as singing too loudly during *mezzo forte* sections or too softly during *forte*—the teacher noted a gradual reduction in these issues over time, suggesting that students' understanding developed not only cognitively but also through practical application in vocal performance.

This evaluation process also enabled the teacher to identify students who required further reinforcement and provided a foundation for developing future instructional strategies. Overall, the evaluation results illustrate that the multisensory approach was effective in enhancing both the conceptual understanding and performance skills of students in learning dynamics in singing.

## 5. Discussion

This study demonstrates that a multisensory approach integrating visual cues (color representation), kinesthetic movement, and auditory experience can effectively support elementary school students' understanding and application of singing dynamics. The findings reveal that students showed improved awareness of dynamic distinctions, greater control of vocal intensity, and increased engagement during singing activities. Through the use of color-coded lyrics and body movement, abstract dynamic concepts such as piano, mezzo forte, and forte became more concrete and accessible for young learners, enabling them to respond expressively during vocal performance.

These findings are consistent with previous research emphasizing the effectiveness of multisensory learning in music education. Studies have shown that engaging multiple sensory modalities enhances cognitive processing, memory retention, and musical understanding (Denervaud et al., 2019; Georgieva, 2024; Gori et al., 2021). In particular, embodied learning through movement has been found to support children's internalization of musical elements by linking physical action with auditory perception (Ow et al., 2023; Papazachariou-Christoforou, 2022; Sinn Ow et al., 2023). Similarly, the use of visual representations such as color-coded notation has been reported to increase student engagement and facilitate the comprehension of abstract musical concepts (Antunes et al., 2024; Demirel, 2022). The present study extends these findings by demonstrating that the combined use of color representation and body movement is especially effective in the context of teaching singing dynamics, rather than instrumental or general music learning.

While previous studies often focus on instrumental instruction, rhythm development, or early childhood musical play, this research highlights vocal dynamics as a core expressive element in elementary music education. The findings indicate that multisensory strategies not only support students' cognitive understanding of dynamic concepts but also enhance their expressive vocal performance. Minor differences were observed in students' ability to regulate vocal intensity—such as tendencies to sing too loudly or too softly at certain dynamic levels—which align with earlier studies noting developmental variability in children's vocal control. These differences suggest that multisensory instruction supports learning progression rather than producing immediate uniform mastery (Barrett & Welch, 2023; Borges Campos, 2023; He & Suttachitt, 2024).

From a pedagogical perspective, the findings imply that elementary music teachers can benefit from integrating multisensory strategies into singing instruction, particularly when teaching abstract musical elements such as dynamics. Color-coded visual cues and body movement offer practical tools that help students connect conceptual understanding with physical experience. Theoretical contributions of this study lie in its application of multisensory learning principles specifically to vocal dynamics learning in elementary school settings, an area that has received limited empirical attention. However, this study is not without limitations. The research was conducted in a single classroom context with a relatively short intervention period, which may limit the generalizability of the findings. Future research could explore the long-term impact of multisensory approaches on vocal development across different age groups and educational contexts

## **6. Conclusion**

This study was conducted to explore how a multisensory approach supports elementary school students' understanding and application of singing dynamics in classroom music learning. The findings indicate that integrating visual cues (color representation), kinesthetic movement, and auditory experience effectively helps students comprehend abstract dynamic concepts such as piano, mezzo forte, and forte, both conceptually and in vocal performance. By transforming abstract musical elements into concrete and embodied learning experiences, students demonstrated improved control of vocal intensity, greater expressive awareness, and increased engagement during singing activities.

From a pedagogical perspective, this study highlights the value of multisensory strategies as practical instructional tools for elementary music teachers, particularly when teaching abstract musical concepts such as dynamics. The use of color-coded lyrics and expressive body movement enables students to connect conceptual understanding with physical experience, supporting more meaningful and engaging vocal learning. Theoretically, this study contributes to multisensory music education research by extending its application to vocal dynamics learning in elementary school contexts, an area that has received limited empirical attention.

Despite these contributions, this study has several limitations. The research was conducted within a single classroom setting and over a relatively short instructional period, which may limit the generalizability of the findings. Future studies are encouraged to examine the long-term effects of multisensory approaches on students' vocal development and to explore their application across different grade levels, school contexts, and cultural settings.

### **Limitation**

One of the main limitations of this study is the relatively short duration of the intervention, which may not have been sufficient for long-term retention or for students with slower learning paces. The study was also limited to a single class in one school, which may reduce the generalizability of the results to broader populations. Additionally, technical limitations such as the lack of individual visual aids and minimal integration of digital tools restricted the scope of multisensory engagement that could have been achieved.

### **Recommendation**

Based on the results, it is recommended that educators consider integrating multisensory strategies more widely in music education, especially for abstract concepts such as dynamics. Future researchers could conduct longitudinal studies to assess the long-term impact of this approach and explore its effectiveness across different age groups and learning abilities. It is also suggested that schools and educational stakeholders invest in the development of accessible learning media—such as portable color-coded tools or interactive applications—to support multisensory instruction both in the classroom and at home.

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## Conflict of Interest

The Author(s) declare(s) that there is no conflict of interest.

## Declaration of Generative AI-assisted Technologies

This manuscript was prepared with the assistance of Generative AI such as ChatGPT and Translator. The AI was used to assist in drafting, translating/language refinement, and content organization. All intellectual contributions, critical analyses, and final revisions were conducted by the authors. The authors take full responsibility for the accuracy, originality, and integrity of the content presented in this work.

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