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Marja-Leena Juntunen

Introduction

In this article, I will discuss how the use of body movement in music education, particularly the whole-body responses to music, reinforces embodiment (mind-body wholeness) and supports embodied learning. Today, embodiment and embodied learning are increasingly explored in music education research and practice, with rapid development over the past 20 years. Theories of embodied learning have been created and presented in fields such as phenomenology, cognitive sciences, and educational psychology. These theories not only offer new perspectives on music education practices but also support long-standing pedagogical approaches that emphasise holistic embodied participation and learning. Pedagogies that emphasise embodiment often advocate for movement-based participation in learning and teaching. The use of body movement in music education was pioneered in the late 19th century by Swiss composer Émile Jaques-Dalcroze (1865–1950), a professor of solfège and harmony at the Geneva Conservatory. While teaching music, he noticed several deficiencies in music education. For instance, traditional methods of training musicians focused solely on the mind: (1) Music was taught through abstractions, with little connection to students' concrete musical actions, emotions, sensations, and experiences; (2) students at the Geneva Conservatory often performed mechanically, without expression; (3) furthermore, he observed that children were primarily taught to play and sing, but rarely to hear and listen to music (Jaques-Dalcroze, 1921/1980).

Additionally, he observed that his students responded to music through movement and that musical sensations activated the muscles and nervous system of the entire body (ibid.). As a result, Jaques-Dalcroze began exploring the integration of body movement in music education. Initially, he introduced movement in his solfège lessons at the conservatory, but soon extended these ideas to children, as they naturally responded to music through movement. He believed that, before beginning instrumental studies, children should experience music with their whole bodies, through moving, singing, and listening.

Using contemporary terminology, his primary focus became how musical experiences and understanding could become more embodied—rooted in perceptions and lived bodily experiences. In other words, Dalcroze pedagogy is in principle an embodied practice that seeks to make music felt, experienced, and understood through the body and movement. Jaques-Dalcroze's ideas were later adopted and modified by many other music education approaches, such as Orff, Kodàly, and Gordon, which have also influenced each other in many ways (Abril, 2011). While these approaches share similarities they also differ in the role and methods of incorporating body movement; however, they all build upon the inseparable connection between music and movement/dance (Juntunen, 2016). Nowadays, playful music-movement integration can be part of any music education practice beyond specific methods, enabling a holistic experience and learning of music. There are many ways to integrate body movement into music education, and movement can serve various roles in

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music learning and teaching as well as enhance a wide range of musical skills and development, as presented in the Table 1.[1]

Body movement in music learning and teaching can be used

- to explore and experience music
- to enrich musical listening and experience
- to enable musical agency (even for those who cannot sing or play any musical instrument)
- to show what a student hears and what she has learnt
- to enable embodied learning (of music)
- to deepen musical understanding
- to improve overall motor skills, coordination and kinaesthetic awareness
- to develop bodily knowing and an awareness of the physical demands of performing (for example, an in situ ability to act in a flexible way)
- to strengthen embodied expression
- to support sense of self
- to develop imagination and social skills
- to bring joy and foster positive experience
- and so on…

The various areas of musical learning that body movement can be used for

- to achieve a good sense of rhythm
- to intensify, focus and improve listening skills
- to gain and deepen understanding of music and musical elements
- to enliven and enrich musical expression
- to learn new music repertoire
- to study music history and cultures
- to improve overall motor skills, coordination and body awareness and thereby improve physical performance
- to develop synchronisation skills
- to develop the capacity to create.

Table 1. Different roles of body movement in music education, compiled from Juntunen, 2016 and 2020.

The innovative music educators behind the approaches mentioned above primarily based their suggestions on their own experiments and experiences. Today, there is substantial research evidence supporting their suggestions, providing theoretical foundations for their practical pedagogical ideas and highlighting the significant impact of body movement on learning. These arguments include, for example, that learning processes and body movements are inextricably linked, and that both partial- and full-body movements can

[1] For a review of the role of body movement in music education, see Abril (2011), Davidson (2009), and Ferguson (2005), among others.

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positively influence children's learning and performance, particularly when movements are incorporated into the classroom environment and integrated into learning tasks (Chandler & Tricot, 2015). Numerous studies suggest that motor functions, rhythmic abilities, and the development of communication and language skills are interconnected (e.g., Corriveau & Goswami, 2009; Thomson & Goswami, 2008; Tierney & Kraus, 2013). The younger the students, the more important tactile-kinaesthetic learning becomes in general (Chandler & Tricot, 2015). Recently, it has been suggested that using whole-body movement is more effective for learning than small movements (such as moving fingers) (Gallagher, 2024). Evidence from brain research demonstrates an unbreakable link between the auditory and motor systems in music perception and interpretation (e.g., Hodges & Gruhn, 2012), suggesting a strong connection between music and movement. The way the body moves to music influences the auditory perception of rhythm, for example (Phillips-Silver & Trainor, 2007). In cognitive sciences, embodied approaches to music cognition emphasise the interactive nature of learning and how embodied experiences, particularly those involving movement, inform and shape musical cognition (Leman, 2007), as well as how sensorimotor abilities influence musical processes (Matyja & Schiavio, 2013; van der Schyff, 2015)

There is also substantial research evidence supporting the educational, therapeutic, and rehabilitative benefits of music-movement integration. For example, in individuals with special educational needs, improvements have been observed in areas such as inclusion, reductions in compulsive and problematic behaviours, self-regulation, perceptual and cognitive abilities, linguistic and learning skills, auditory attention and phonological awareness, social interaction, engagement, and agency (Juntunen & Sutela, 2023). In older adults, the benefits extend to cognitive, physical, social, and emotional capabilities (ibid.). The effectiveness of music-movement integration is often linked to the production and experience of rhythm (e.g., Bouloukou et al., 2021) and the multimodal activation of different senses during learning (Juntunen, 2020).

Embodiment and embodied learning

Embodiment is currently a widely used term, but with varying definitions. My understanding of embodiment draws on the phenomenological philosophy of Maurice Merleau-Ponty.
I have applied his ideas to interpret the role of body movement in music education.
Merleau-Ponty (1962) is recognised as a philosopher of embodiment, as he strongly argued against the dualistic view of human beings. He emphasised the primacy of the body in shaping our experience of the world. He introduced the concept of the *lived body* (*Leib*), as opposed to the *physical body* (*Körper*), to highlight that our bodies are not merely physical entities but are integral to our perception and interaction with the world. Merleau-Ponty argued that perception and experience are always embodied. Our bodily experiences are not simply the results of sensory inputs processed by a detached mind; they are fundamental to how we understand and interact with the world. The body is conceived as an active participant in shaping our perception and, therefore, our understanding of the world. For me, Merleau-Ponty's ideas resonate with what happens in the bodily exploration of musical worlds through body movement (Juntunen, 2004).

Thus, embodiment (here) is a notion used to overcome dualism (Altenmüller, 2019) and implies the integration of the physical or biological body with the lived, experiential, or

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phenomenological body (Merleau-Ponty, 1962). This suggests a network that integrates thinking, being, doing, and interacting (Varela et al., 1991). In other words, it views the mind as embodied and the body as mindful (Sheets-Johnstone, 2011). Consequently, relying on Merleau-Ponty's argument that we come to know the world through the experience of our embodied exploration in and through the world has implications for our understanding of the act of learning (Stolz, 2015). Since our engagement with the world is not limited to the cognitive domain, all the ways we perceive and experience the world become integral elements of learning. Learning is not purely an intellectual act but a process that integrates all sensory perceptions, sensations, emotions, and thoughts in interaction with the world and its environments.

Thus, embodied learning 'emphasises action and engagement as primary, preceding, and grounding all theory' (Yakhlef, 2010, p. 415). It implies learning from experiences of bodily engagement and the interaction of the self with the physical and social environment through sensory perceptions and mind-body action and reaction (Kerka, 2002; Yakhlef, 2010). Learning is influenced by thought, emotion, and bodily experience alike. Embodied learning is also transformative, meaning it does not merely result in new understandings but changes the way we perceive, think, and act (e.g., Juntunen & Westerlund, 2001; Westerlund & Juntunen, 2005). In practice, teaching for embodied learning advocates promoting students' active engagement in the classroom (Kosmas et al., 2018), which connects bodily movements, physical interaction, and sensorimotor abilities with the learning content (see Table 2).

Embodied learning entails
● Emphasising perception, action, and engagement as primary–preceding and grounding all theory (Yakhlef, 2010; Kosmas et al., 2018) ● Building and connecting bodily movements, physical interaction and sensorimotor abilities within the learning content (Anderson, 2003; Brooks & Goldin-Meadow, 2016) ● Integrating sensing, feeling, thinking, and doing (Juntunen, 2004) ● Mediating intellectual performance, sensory stimulation, communication abilities, and other conditions of learning through body-based processes (Nathan, 2021, abstract)
Embodied learning can be further strengthened, for example
● By pacing the exercises to achieve a balance between the mental and physical energy required ● By a frequent call to pay attention ● Through sharing experiences or reflecting on them right after being actively involved

Table 2. Embodiment in learning

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Sensory awareness and multisensory integration

But let us now discuss what happens when we respond to music through whole-body movement. In order to respond to music, we first need to listen to it. Listening is a very physical experience, as sound waves strike the eardrum and skin, pass through to the bones, and resonate throughout the body. In music-movement integration, the body and the ear form a dynamic partnership. In this partnership, listening inspires movement expression, while movement guides and informs listening (see Juntunen, 2016). Bodily sensations, through proprioception and kinaesthesia, play a crucial role.

Proprioception is the sensation of inhabiting a body: perceiving the body from within and understanding where it is in space and how it moves, as well as recognising different movement qualities (Parviainen, 2002). It was initially called the *muscular sense* and later *kinaesthesia*. Currently, both proprioception and kinaesthesia continue to be used as terms in the literature. Kinaesthesia can refer to 'either non-conscious *information* or a form of conscious *awareness*' (Gallagher, 2006, p. 7; italics original). At an experiential level, these are integrated. In a broader sense, kinaesthesia involves 'integrating different modalities of sensory information concerning one's own body as a moving agent in the environment' (p. 7). Thus, kinaesthesia is an essential sense when learning through movement.

The challenge in learning through movement is that bodily sensations and movement are 'fundamentally personal,' and although we are constantly perceiving, we are not often consciously aware of it (Tuthill & Azim, 2018). Awakening ourselves to perception and paying attention to what we can sense is one of the first steps in reinforcing mind-body wholeness and embodied learning. Awakening to perception and becoming aware is also a way to be present in the moment. There are various exercises for heightening body awareness (see Table 3), including breathing exercises, mindfulness meditation, and different awareness techniques, such as the Alexander Technique or Feldenkrais Method. In music teaching, one possibility is to start a lesson with an exercise where participants focus on and become aware of what they see and hear, and their bodily state and inner feelings.

When responding to music through movement, one's own movement and the sensation of it further guide listening and movement. When moving to music in a group, participants not only listen and respond to music individually but also observe and perceive the movements of others, which further informs their responses. This kind of multisensory integration—the integration of information from different sensory modalities—is one of the recognised educational and therapeutic strengths of music-movement integration (e.g., Altenmüller & Scholz, 2016).

Feeling the body and movement

In music-movement integration exercises, participants are often asked how it feels (Juntunen, 2002). This question invites them to become aware of how the movement or music feels in their body. By paying attention to themselves as they move, participants can discover the ‘felt experience’ of moving to music. Awareness can be directed towards their physical state, emotional state, the experience of having moved, or the bodily sensation of the situation as a whole. Table 3 lists various ways and exercises to awaken awareness of movement and kinaesthetic sensations.

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Exercises that increase body awareness, including kinaesthetic sensations.

- Breathing exercises
- Mindfulness meditation
- Awakening perception (looking around, listening, becoming aware)
- Body awareness techniques, such as Alexander Technique
- Starting/stopping movement games
- Inhibition/excitation exercises where you are supposed to react to the music in a certain way, for example stop moving when you hear a triplet in the music, while resisting some "natural" reactions, such as not stopping when the music stops.
- Making the familiar strange: By changing familiar ways of moving, you can reacquaint yourself with familiar habits (Sheets-Johnstone, 1999, p. 143). For example, by varying the way we walk (on our toes, heels, inside of the foot, etc.) or by trying completely new, even strange ways of moving, we can experience walking in a different way.
- Let's try another way: ask participants to improvise spontaneously first, and then change the way they respond to the movements, doing things differently than before. This increases awareness of your own movement.
- Experimenting with another's movement: awareness of one's own movement can also be strengthened in a group by highlighting a participant's way of moving, which is observed and possibly experimented with together. Such experimentation with another's movement not only increases awareness of one's own movement, but can also broaden ways of moving, listening and thinking.
- Moving in synchrony: The ability to move in synchrony with others requires sensitive listening, awareness and adaptation to the movement and rhythm of others.

Table 3. A list of exercises compiled from Juntunen, 2000, and Juntunen & Hyvönen, 2004.

By becoming aware of and sensitive to the quality of their posture and movements, participants can gradually develop a more acute perception of their body's condition and gain constructive, conscious control over their habits. This implies an ability to change culturally learned and maintained "bad" habits, which, in turn, leads to improved bodily functioning.

Awareness of one's movement is also closely connected to one's sense of self. When participants explore music through body movement and experience the feeling of "I can do it" or "I am right", it enables them to recognise themselves as agents of knowledge, and a sense of self emerges.

Engaging with emotions

Emotions play a crucial role in interaction and learning. Educators like Jaques-Dalcroze understood that joy and positive experiences support learning. Today, studies in psychology and other fields support this understanding (e.g., Cronqvist, 2021), further suggesting that emotionally engaging and playful exercises motivate participation (e.g., Flaugnacco et al.,

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2015). In their article *We Feel, Therefore We Learn*, Immordino-Yang and Damasio (2006) propose that learning, attention, memory, decision-making, and social functioning are profoundly influenced by emotions and that emotion-related processes are essential for skills and knowledge to transfer from the school environment to real-world decision-making.

To create an atmosphere of play and joy, many music-movement exercises are designed as games. These "games" may include follow-and-quick-reaction exercises, echo, canon, and substitution. All these activities are intended to facilitate rapid and direct communication between perception, thought, and action. In these games, students play "against" the music, following set rules but without competing against one another. The playful spirit frees students from self-consciousness and brings joy.

Mind-body engagement through improvisation

Music-movement integration activities in both the Dalcroze and Orff approaches incorporate a great deal of improvisation, which has several pedagogical and educational advantages. Responding to music through improvised movement, and improvisation more broadly, stimulates and stretches the imagination, engaging our creative abilities. Improvisation motivates participants to express their own ideas, fostering a sense of accomplishment and satisfaction. With regular improvisation activities, creative actions like improvisation become a natural part of learning and musicianship.

Improvisation supports and requires being-in-the-moment and staying ready to respond, which effectively enhances the mind-body connection. Improvisatory engagement, as opposed to learned movement phrases, has been recognised as a key benefit of music-movement integration in various rehabilitation and therapeutic contexts, for example among older adults and those with dementia (e.g., Kressig, 2017).

Imagining movement, either before or after performing it, develops the imagination and the ability to create sensory images, which has numerous applications in mental training. Imagining movement especially broadens kinaesthetic imagination. It also allows students to re-experience and internalise movement. Interestingly, music-induced body movements can evoke a sense of imagined participation, where the motor resonance of music may create an illusion of taking part in a skilful musical performance, even if this might not be possible in reality (Maes et al., 2014).

Improvisation is a problem-solving activity that requires cognitive processing. Though movement responses are often improvised in music-movement integration exercises, the task may require participants to respond to specific aspects of the music or in a particular way. For example, they might be asked to show the first beat of the measure through movement or to tap the melody rhythm on their body while walking the beat. Such dual- and multitask exercises integrate motor and cognitive components, targeting attention and executive functions, which is why they are considered to have significant therapeutic and rehabilitation potential (Trompetti et al., 2011).

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Auditory-motor entrainment

In music-movement integration, the task often involves expressing a particular element of the music through movement. To achieve this, one must first identify that element by listening carefully and then synchronise their movement accordingly. The focus is frequently on rhythmic elements such as pulse, metre, tempo, and phrasing, but movement can also represent other musical qualities, such as dynamics or texture.

In Dalcroze practice, learning to synchronise movement with music often begins by associating the pulse or beat with walking, recommended with children aged over 3 years, allowing participants to experience how walking feels and sounds when accompanied by improvised music. Recent research supports the use of walking as a starting point, as it is an innate and steady rhythmic movement that is highly automatised and does not require conscious control (Wallén et al., 2007). However, walking in time with music is not always straightforward and often requires practice. As Moens and Leman (2015) observe, 'finding the beat is the most difficult part of entrainment, whereas keeping the beat is easier once a temporal scheme has already been established.' For children, it may take time to align their movements with the beat of the music. Children tend to perform best on such tasks when the tempo closely matches their relatively fast walking pace. Several recent studies indicate that when working with live music, children find it easier to detect the beat if it is reinforced—such as by voice, the click of a metronome, a percussive sound, or a visual cue (for example, watching someone else move).

Interpersonal synchrony and understanding

The social aspect—how we interact with and understand one another—is closely linked to embodiment. It can be argued that integrating music and movement promotes understanding between people in several ways, for example, through interpersonal synchrony and sensing the movements of others. In music-movement practice, participants not only align their movements with the music but also with the other participants, intending to move together and synchronise their movements. Thus, it is not surprising that rhythmic instruction integrating music and movement has a positive impact on synchronisation skills (Overy, 2012; Repp, 2006) and an ability to recognize social interaction (Ginman et al. 2022). When the movements or sensations of two or more people overlap in time and form, either simultaneously or with the same timing, this is referred to as interpersonal synchrony (Rennung & Göritz, 2016). Currently, there is extensive research on the educational and other benefits of being able to synchronise one's movement with others. It is suggested, for example, that it is not only rewarding but that synchronous music-making or music-related movement fosters social connections with others (Waclawik, Watson & Grahn, 2016). It is also considered an effective means of understanding one's interaction partner and, therefore, a prerequisite for successful cooperation (Wheatley et al., 2012). According to Rennung and Göritz (2016), '[t]he capacity to establish interpersonal synchrony is fundamental to human beings because it constitutes the basis for social connection and understanding'; it strengthens the experience of humanity and community. Furthermore, it is suggested that interpersonal synchrony enhances prosocial development (that is, an intent to benefit others). For example, Cirelli with others (2014) found that interpersonal auditory-motor entrainment to an external beat is associated with increased group cohesion and social bonding. Individuals who walk, sing, or tap together tend to be

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more helpful, compliant, or cooperative in subsequent interactions (Wiltermuth & Heath, 2009; Hove & Risen, 2009). Evidence for this effect has also been demonstrated in four-year-old children (Kirschner & Tomasello, 2010), and even among infants (Cirelli et al., 2014).

In movement responses, especially when improvising together, participants attune to one another's movements by watching and listening with their whole bodies. They thus practise an ability to understand others' intentions and movements through what, in phenomenology, is termed kinaesthetic empathy (Reynolds & Reason, 2012), identified in cognitive science as operating via mirror neurons (e.g., Kaplan & Iacoboni, 2006; Gallese, 2001). Kinaesthetic empathy is a special kind of autonomous act. It helps individuals to understand others' movements and is a cultural and embodied phenomenon that refers to the ability to experience empathy merely by observing and sensing the movements of others.

When people interact through body movement, they perceive one another non-verbally, through the body. In fact, as Shaun Gallagher (2020, p. 98) argues, understanding other people is primarily based on embodied practices rather than theoretical inference or internal simulation. Or, as Mark Johnson (2015) describes, 'our very ability to understand our world and other people arises from the nature of our bodily existence...plus the embodied interactions we have.'

Conclusion

To conclude, music-movement integration, such as responding to music through movement in interaction with others, is a complex process that reinforces embodiment—the mind-body-emotion wholeness—and enhances embodied learning in many ways, for example, by

- requiring concentration, awareness, and alertness to respond
- reinforcing listening (to music and others)
- engaging and integrating multimodal perceptions/sensations, sensorimotor system, emotions, and cognitive faculties
- facilitating learning from and based on perception and embodied experience
- involving constant variation of action, improvisation (inc. quick-reaction), and creativity
- considering the role of joy and positive experience for learning
- practising interpersonal synchrony and entrainment with music
- supporting interpersonal understanding through interaction, synchronous movement, and cooperation.

Through such exercises and practices, music-movement integration may engage in very essential processes of being a human being and living with others; engaging in processes that promote development of a complex network of interconnected skills and abilities, including pro-social behaviour and interpersonal understanding.

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