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Embodied Learning Through and for Collaborative Multimodal Composing:
A Case in a Finnish Lower Secondary Music Classroom

Marja-Leena Juntunen
Sibelius Academy, University of the Arts Helsinki, Finland

Abstract

This article analyzes how embodied learning was enhanced in a project in which students made a music video with a tablet, combining music and movement compositions, in a Finnish seventh-grade music classroom. Student interviews and reflections, as well as researcher's field notes were used as material for the analysis. In the project, embodied learning took place through active participation and multi-sensory perception and experiences. Learning was enhanced by focusing students' attention to and awareness of each activity and their kinesthetic experiences, then by reflective assignments. Preparations for the music and movement compositions included explorative and improvisational Dalcroze-, Orff-, and Laban-based music-and-movement exercises, the rehearsal of movement material for composition, and the

creation of a safe and comfortable social space. Making the video fostered embodied learning since it required students to remember, re-experience, and apply previous activities, and incorporated multimodal expression. Tablets served as easy and manageable digital tools for meaning-making and multimodal expression in addition to making achievements both explicit and shareable.

Introduction

This article draws on a case study in which a music teacher in a Finnish lower secondary school explored the possibilities of making a music video using tablets in a seventh-grade music classroom. The aim was to integrate the use of technology with music teaching and learning, and to enhance student participation as well as creative and multimodal expression and learning in music. The tablets were used for multimodal expression that integrated music composition with movement composition. The project was motivated by the new Finnish Core Curriculum of music (FNAE 2014), which highlights creative engagement and the use of technology in music instruction. It was also influenced by the teacher's concern regarding student participation in music lessons (see Anttila, 2010), which she wanted to increase through the use of technology. Such impact has been identified previously within the field of education (e.g., Karsenti & Fievez, 2013).

In this article, the project was examined from the perspective of embodied learning. The research question, "How did the different activities (body movement, interactive group exercises, collaboration, vocal and movement improvisation, music and movement composition, and tablet usage), and their integration as an attempted multimodal composition, enhance embodied learning?" was asked. The answer to this question is based on the analyses of the students' reflections and experiences in addition to the researcher's interpretation of the pedagogical processes and methods observed and documented in the field notes. The research task was motivated by the aim to understand how embodied learning can be enhanced in a music classroom in general, and how the use of digital technology can be integrated to support embodied learning.

The classroom teaching experiment (Cobb, 2000) integrated body movement with the use of technology in a music education context. There is much variance among viewpoints concerning the pedagogical possibilities of implementing technology to enhance learning. For example, several dance educators and philosophers have criticized the increasing use of technology (e.g., Anttila 2013; Parviainen 2006). Among other things, they have argued that the use of technology directs attention away from the body and its relation to the physical and social reality, limits bodily interaction with others, restricts and hinders bodily engagement in learning, and thus limits possibilities for embodied learning (e.g., Anttila, 2013, pp. 111–112;

Parviainen, 2006). Within the field of educational technology, an opposing stance is upheld. The use of technology is viewed to increase bodily engagement as well as embodied and multimodal learning (e.g., Birchfield & Johnson-Glenberg, 2012). New (semi-) virtual learning games and mixed-reality learning environments are being developed for these purposes. Through the use of this technology, embodied learning is facilitated via the movement of the body in space while the individual interacts with visual and/or sonic media (e.g., Johnson-Glenberg et al., 2011).

In music education, the use of technology is viewed positively, in the sense that it, for example, offers new learning environments and modes of collaboration in addition to expanding creative possibilities (e.g., Burnard, 2007; Burnard, 2012; Dillon, 2010). Technology is also recognized as having the potential to facilitate multimodal learning by allowing the integration of visual and aural representations. Additionally, technology is viewed as something that aids young people in constructing their emerging selves and developing critical consciousness and autonomy (Odena, 2012). Yet, the multimodal aspects of and possibilities for the uses of technology are rarely addressed.

Earlier Studies on Embodied Learning Within Music and Arts Education

Although music is a thoroughly embodied practice integrating acting, feeling, and thinking (Juntunen, 2017), embodied learning has been poorly examined and discussed within the context of music education research, but it has recently received an increasing level of attention (e.g., Ferm, 2008; Schiavio & van der Schyff, 2018). The notion of embodiment is considered fundamental within music education philosophy (e.g., Bowman, 2004; Elliott & Silverman, 2012), recent music and emotion research (e.g., Vines et al., 2005; Juslin & Timmers, 2010), and music and gesture research (e.g., Gritten & King, 2006; Godøy & Leman, 2010; Toiviainen et al., 2010). In addition, many empirical studies in music performance and musical communication (e.g., Timmers, 2007; Broughton & Stevens, 2009; Keller & Appel, 2010; Kawase, 2014) draw on embodied aspects. Within dance education, Anttila (2015) considers embodiment to be the core concept with regard to learning in the arts.

Émile Jaques-Dalcroze began applying body movement in music teaching and learning in order to enhance embodied learning in the late 19th century at the Geneva Conservatory of Music[1]. His ideas regarding the interconnectedness of music and movement and creative movement expression were later adopted and further developed by Rudolf von Laban, Carl Orff and Zoltan Kodály, among others (Abril, 2011). Recent studies in music education (e.g.,

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[1] For more information about Dalcroze approach, see e.g., Juntunen, 2016.

Bowman & Powell, 2007; Rabinowitch et al., 2012), cognitive science(s) and neurosciences (e.g., Hodges & Gruhn, 2012; Schiavio & De Jaegher, 2017; Seitz, 2005a, 2005b), and psychology (Damasio, 2000) support the ideas of applying body movement in music teaching and learning. Empirical studies examining the influences of using movement in music teaching and learning suggest, for example, that that the use of movement develops abilities such as a sense of rhythm (Wang, 2008; Walters, 1983), melodic and pitch discrimination (Crumpler, 1982; Gruhn, 2002), music perception and listening (Burnett, 1983), motor performance (Brown et al., 1981; Zachopoulou et al., 2003), and expression in singing (Davidson, 2009; Ebie, 2004). Studies reporting music (education) students' experiences suggest, for example, that Dalcroze-inspired movement activities foster musical understanding (van der Merwe, 2015).

In music-and-movement teaching, learning takes place through multimodal (or multisensory) integration (Juntunen 2020). Researchers have uncovered many benefits of a multimodal focus in music education. For instance, multimodal pedagogy helps students retain knowledge they have gained for a longer time as they become involved with the content using aural, visual, and kinesthetic or tactile modalities (Baines, 2008; Odena, 2012). Miller (2002) observed that using a multimodal approach in a music classroom results in increased engagement from all students, more widespread initial learning, and deeper learning, illustrated by long-term retention and transfer of knowledge. Using different modalities inside the music classroom is also considered to be an effective way of meeting students' different needs (Campbell & Scott-Kassner, 2006; Conway, 2009; Darrow, 2007; Ebie, 2004; Stein, 2008).

Embodied Learning as Theoretical Framework

The embodied learning approach is based on the idea of an inseparable link between body and mind in learning (Yakhlef, 2010). In phenomenological terms, it avoids a distinction between perceiving, knowing, understanding, and doing (Stolz, 2015). In embodied learning sensation, perception, and action work in collaboration throughout the body and affect one another (Rouhiainen, 2007). Embodied learning involves learning from experiences of the interaction of one's self with the physical and social environment through senses, perceptions, and mind-body action and reaction (Kerka, 2002; Yakhlef, 2010). Thus, embodied learning takes place within the entire human being. Yet, embodied learning is not automatic; it requires attention and awareness. Therefore, developing the capacity to act with awareness—to be fully present to what is taking place—is fundamental (Goldman Schuyler, 2010).

The embodied view of learning and knowing goes beyond what can be thought and verbally articulated to include that which occurs tacitly. Sometimes embodied learning is seen as an alternative to "mentalistic education" reflecting the theories that "separate the mind from the

body" (Makedonia, 2019), as it advocates teaching that requires engagement of the body in cognitive processes (Kosmas et al., 2019). It is related to an epistemological change called 'the corporeal turn' (Sheets-Johnstone, 2009), which articulates the pre-reflective, pre-discursive, and pre-social implicit dimension of human cognition, action, and interaction.

Within cognitive sciences, embodied learning is discussed and examined based on *embodied cognition* (EC) research describing how the body and environment are related to cognitive processes (e.g., Glenberg, 2010; Shapiro, 2010). EC argues that cognition is embodied and grounded in sensorimotor and motor experiences (e.g., Johnson, 2007). According to the EC perspective, perception, cognition, and action occur simultaneously and are closely intertwined, rather than being separate and sequential stages in human interaction with the physical world (Birchfield et al., 2008).

In music research, the enactivist approach has aimed to further develop the cognitivist and embodied approaches to music cognition. As I see it, by paying attention to musical experience and pre-conceptual and pre-linguistic form of understanding related to musical action and learning, the enactivist approach moves toward phenomenology. Recently, the enactivist approach has been used to examine the role of body and movement in and for (musical) knowing and learning. It uncovers how a meaningful world is 'enacted' through continuous interactivity between an organism and its environment (van der Schyff, 2015). This is based on the idea that various aspects of our cognition are dependent on our sensorimotor abilities and skills. In other words, sensory-motor and affective processes shape the way in which the perceiver-thinker experiences the world and interacts with others (Gallagher & Lindgren, 2015). Thus, cognition is rather what we do than what passively happens to us, which implicates the importance of the body in cognitive processing (e.g., Matyja & Schiavio, 2013). In line with phenomenological theories that maintain the importance of intersubjectivity in knowing, the enactivist theories emphasize the role of interaction in learning. For example, Gallagher and Lindgren (2015) suggest that joint action and participation can result in an understanding that extends well beyond any individual accomplishment.

While a large part of embodied learning research in instructional settings concerns a learner's entire body, other studies focus on different aspects, such as gesturing or minor movements, or even just observing movements instead of actually performing them (Skulmovski & Rey, 2018). For example, Pouw and et al. (2016) demonstrated that animations depicting learning content from the field of physics can be enhanced by including a drawing of a human to help learners understand an otherwise abstract relation. Several theoretical models emphasize the role of extensive forms of bodily movement (such as locomotion) (e.g., Johnson-Glenberg et al., 2014; Mavilidi et al., 2015; Mavilidi et al., 2016; Ruiter et al., 2015), while others offer a

more general model based on the dimensions of bodily engagement and task integration (Skulmovski & Rey, 2018). On the whole, studies suggest a positive effect of body movement on learning in general as well as on cognition (e.g., Chandler & Tricot, 2015; Goldin-Meadow et al., 2009). Additionally, Chandler and Tricot (2015) note that body movement, such as gestures, can help offload working memory, which in turn allows working memory resources to be used in creating a deeper understanding. However, it is suggested that bodily movements, physical interaction, and sensorimotor abilities must be linked with the learning content in order to support learning (Anderson, 2003; Brooks & Goldin-Meadow, 2016).

Within the field of educational technology, studies build on emerging research from the learning sciences and human-computer interaction that pair theories of embodied learning with a class of immersive technologies referred to as mixed reality. They build on the premises that (1) the body, as well as the activity of multiple sensorimotor systems, can be an important catalyst for generating learning, and (2) learning is effective when it is embodied, collaborative, and multimodal (e.g., Birchfield & Johnson-Glenberg, 2012; Lindgren & Johnson-Glenberg, 2013). A wide variety of studies, inspired by EC, focus on the use of digital media in learning (for an overview, see de Koning & Tabbers, 2011; Lindgren & Johnson-Glenberg, 2013). These include studies examining whether particular types of tablet computer interactions yield higher learning results (e.g., Agostinho et al., 2015; Dubé & McEwen, 2015), or whether interactive mixed-reality settings involving bodily movement can offer advantages for learning (e.g., Johnson-Glenberg et al., 2014; Johnson-Glenberg et al., 2016; Lindgren et al., 2016).

The recent discussion on embodied learning emphasizes multimodal[2] aspects of learning. The *sensory modalities* that we 'normally' use for learning are visual, auditory, tactile, and kinesthetic. In teaching and learning, language is commonly regarded as the primary mode of communication while image, gesture, and action are regarded as illustrative support to the 'real thing' (Kress et al., 2001, p. 42). Multimodality considers representation, communication, and interaction as something more than language (Bezemer & Kress, 2015) and suggests, "meanings are made (as well as distributed, interpreted, and remade) through many representational and communicational resources, of which language is but one" (Jewitt, 2008, p. 246).Multimodality addresses meaning as it is made equally through a multiplicity of modes, such as speech, image, action, gesture, gaze, posture, sound, and the use of space,

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[2] Drawing on semiotics, *modality* refers to the channels (such as oral, gesture, or written) by which information and meanings are delivered to the senses of the interpreter. *Multimodality* provides an account of the modes—image, action, and so forth—that are available for making meaning, which in turn is made with many modes beyond speech and writing (Kress & Bezemer, 2015, p. 155–156).

through the complexity of interaction, representation, and communication (Jewitt, 2008; 2009). Multimodal learning involves the relation of information from multiple sources (Ngiam et al., 2011). Multimodal learning cannot be separated from embodied learning and, actually, is a way to promote embodied learning. Multimodality tackles how students communicate and learn non-verbally, via postures, gestures, and other means, i.e., how they learn through a variety of (sensory) modalities.

To summarize, theories of embodied learning in both phenomenology and cognitive sciences, argue that learning takes place in the whole body-mind during social and physical interaction with others and the environment. They address the importance of engaging students through both the mind and body, and applying a variety of modalities in learning by moving within and acting upon an environment while interacting with others. In addition, "teaching for embodied learning in multimodal composing" framework (Miller & McVee, 2013, p. xi) provides valid insights for this study by suggesting that embodied learning should include:

- initiating a social space for the mediation of collaborative composing;
- constructing a sense of felt purpose for multimodal composing;
- drawing on and encouraging students to draw on their identities and life-worlds;
- making design elements explicit as meaning-making tools; and
- supporting embodied learning through students' symbolic translation with modes.

Context and Procedure

The examined case took place in the seventh-grade music classroom (compulsory general music course, one lesson per week) of a lower secondary school in the metropolitan area of Finland during the autumn semester of 2014. All students of the chosen class (N=18, six boys and 12 girls) agreed to participate.[3] The project consisted of 15 compulsory weekly music lessons (each 45 min) during the autumn semester 2014.[4] Since the teacher was conducting the project for the first time, there was no fixed plan with a timetable upon starting the project. The project evolved according to weekly achievements. The students worked autonomously after the preparatory exercises, so some finished their work earlier than others.

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[3] The reasons for choosing this one class were related mostly to the timetable and the teacher's preferences/suggestions.

[4] During the project (August 2014 - January 2015), there were 19 weeks of school-going. However, four music lessons were either given by another teacher or the lessons were used for some school activities while this project did not proceed.

The research complied with the code of ethics outlined by the Finnish Advisory Board on Research Integrity (TENK, 2012) and the ethical guidelines according to the standard university research practice. The research project began after the school principal granted permission for the study. Participants and guardians then received invitations and information about the research timetable and purposes of the research before signing consent forms. A guarantee of anonymity, and an assurance that the participants could withdraw from the study at any time without consequence, were carefully explained to the participating students and their guardians.

Teaching Process and Activities

The teaching process (see Table 1) consisted of one (45-min) music lesson per week over the course of 15 weeks. It started with (preparatory) 'music-and-movement' activities, influenced by the Dalcroze and Orff approaches, which the teacher always used with beginning seventh grade students (the first grade of the lower secondary school). Because the students came from different primary schools, there was much variation in their musical skills and experience. In music-and-movement exercises, the focus was on exploring and understanding the basic musical, mainly rhythmic, elements (such as pulse, tempo, beat, phrase, and meter) through the integration of listening, singing, and body movement. While the exercises varied greatly, each intended to instill a 'feeling the music in the body'. These movement-based activities enabled all students to participate in music-making without requiring specific skills and knowledge. The music-and-movement activities included games with student's first names, rhythmic exercises, and simple dances, as well as movement and vocal improvisation. Through the body movement exercises the students explored and practiced, among other things, social interaction and knowing each other, elements and qualities of movement, creative production, concentration, and being present. In each lesson, after the movement exercises, the students were asked to reflect on their experiences, the pedagogical purposes of exercises, and their learning.

After four weeks, the teacher added explorations of Laban's five basic body actions: locomotion, turn, jump, gesture, and stillness, and their combination to the Dalcroze- and Orff-based activities. For example, facial expressions were practiced when combining gesture with stillness. The students explored the body actions through movement improvisation (with musical accompaniment provided by the teacher), and then composed a four-bar phrase (in 4/4 meter) that included all the five body actions. After making this small movement composition, the students co-constructed (in groups of two to four) a four-bar-long movement composition.

The students then used tablets in new groups (of two to four) and started to work in a self-directed way. After briefly introducing the LaunchPad web application, the teacher gave

instructions to compose a 30–60-seconds-long piece of music, inspired by the previously practiced movements, by choosing and mixing loops (pre-recorded extracts of music of different styles) and adding effects that were available in the application.[5] The co-constructed composition included three parts: a beginning, a middle section, and an ending. Upon finishing the music, students were tasked to compose movement to the music by using Laban's five basic body actions and by applying ideas from the previous movement composition. The students were free to decide whether use ideas inspired by their daily life, books, or stories, to tell a story through movement. They could also choose the space within the school building for the recording and could decide whether to use different kinds of props. The movement composition, as a whole or piece by piece, was video recorded with a tablet. Following this, the students edited the music and movement compositions to match each other using the video editor application.

When the video was ready, the students completed a self-assessment form reflecting on their learning. The process ended with the students viewing a compilation of their videos together during the final lesson. After each video, the authors of the video made comments and received feedback from their peers and the teacher.

Table 1

The Process of Activities.

Process	Activities
1:	Preparatory, Dalcroze and Orff based music-and-movement activities: social interaction, sense of rhythm, quality of movement, space-time-energy, listening, concentration, etc.
2:	Laban's five basic body actions –› a four-bar movement composition
3:	Composing a piece of music with the LaunchPad application
4:	Recording video material applying the Laban's basic body actions
5:	Editing the video using the video editor application
6:	Students' reflective self-assessment
7:	Watching a compilation of the videos together, and feedback

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[5] It can be argued as to whether this can be regarded as composing or not. Yet, as most of the students did not have any earlier experiences of creative music making, the teacher saw this as a suitable assignment and introduction to composing.

Methodological Premises, Data Generation, and Analysis

The research was conducted using a multifaceted qualitative approach (Denzin & Lincoln, 2000). The methodology integrated ideas from the hermeneutic tradition (Smith, 1991) and case study (Stake, 2000), with the researcher acting as a non-participant observer. As characteristic of a case study (Stake, 1995), the study used several data collection methods to provide an in-depth examination of the project. The empirical data included semi-structured student interviews (Roulston, 2010), close observations (van Manen, 1990) of classroom activities recorded as field notes, and each student's reflective self-assessment statement, written after finishing the production of their video. The researcher's reflections, thoughts, and interpretations were included in the field notes.

Eleven out of the fifteen lessons were observed. Observations covered all important phases of the project. Student interviews were conducted in December 2014 (in addition to one in January 2015) in groups of two to four students, after they had finished producing the videos. Each session lasted for 10–20 min. One girl and one boy were absent on the day of the interviews. The interviews were semi-structured interviews (Fylan, 2005) since they included questions focused on specific themes, while also allowing for the open introduction of new ideas. The structured questions concerned students' experiences of the various teaching stages and activities as well as their perceptions of what they had learned.

The overall interpretative stance of the investigation draws on the hermeneutic tradition, which includes three themes: "creativity of interpretation, the pivotal role of language in human understanding, and the interplay of part and whole in the process of interpretation" (Smith, 1991, p. 190). In hermeneutics—the theory of understanding and interpretation— understanding is not the product of (objective) interpretation, nor a case of acquiring new knowledge or grasping something pre-given, but a means of interpreting 'the world'. Understanding *is* interpretation: the derivation of meaning. Thus, aiming to understand does not necessitate the exclusion of one's own standpoint, prejudgments, or prejudices; rather, it requires an engagement with one's own biases, and accepts the fact that we belong to some existing tradition that functions as a starting point, yet allows for new understandings. One can neither free nor distance ourselves from such a background—nor should we try (e.g., Gadamer, 1979; Schwandt, 2000). The author's standpoint and interest regarding the study originate from her practical and academic work involving the Dalcroze approach within the context of music education.

The analysis of the data consisted of two phases: First, data analysis of the interview data was conducted, focusing on meaning by the aid of what Kvale and Brinkmann (2009) call "meaning condensation" (p. 205). The meaning condensation included the summarization of longer sequences of interview text into shorter, rephrased texts explicating the main themes.

The meaning condensation provided an inductive reading of the data and an overall understanding of the meanings. Secondly, a theory-driven interpretation of the data that Kvale & Brinkmann (2009), call "theoretically informed reading" was completed (p. 235). In this interpretative process, theories of embodied and multimodal learning were applied. The theoretical interpretation provided a deductive analysis of the data. For example, while re-reading all of the data (including student reflections and field notes), references related to embodiment and embodied learning (mind-body, connections between different actions, lived experiences, relationships, emotions, meanings, understandings, and learning) were noted and marked. Based on this coding, certain parts of the data were chosen and organized according to the codes. To summarize, the analytical approach included both theoretical reading as well as data-driven analysis in an endeavor to understand how embodied learning was enabled and enhanced in the project.

Findings

The research objective was to interpret how embodied learning was enhanced throughout a project that aimed toward collaborative multimodal composition. It should be noted that in this interpretation, the author's understanding of embodied learning, especially regarding the possibilities of applying body movement for enhancing musical learning, played an important role. The objective was to extend the understanding of what embodied learning can imply and how it can be enhanced in a music classroom, and to discuss how digital technology can be integrated in ways that support embodied learning.

In the following section, the findings are presented according to the different aspects of embodied learning that were identified in the analysis. The quotes from the interview data and student reflections (translated from Finnish to English by the author) are included to increase the trustworthiness and richness of the interpretations. The quotes are coded with s1, s2, and so forth.

Awakening Perception

To learn from perception and sensory experience, one must become aware of them. In this project, students were guided toward greater bodily awareness (perceiving and sensing through kinesthesia). This was done by asking the students to pay attention and become aware of their body position, posture, and movement, and to listen and become sensitive to body sensations (e.g., Parviainen, 2000)—how movement is felt within the body.

Awareness was also motivated through non-verbal communication during situations in which the students learned by imitation. As Svendler Nielsen and et al. (2020) note, "[t]he unexpectedness of the situation of 'silent teaching' creates a certain curiosity about what

might happen next and overall it helps to create an engaging atmosphere" (p. 18). For many students, non-verbal communication was a new and unfamiliar way of learning, which heightened attention even more. They were required to watch and listen carefully. During the self-assessment, the participating students reflected on their experiences of non-verbal communication in the following ways:

> *In our first music lessons, we practiced using our own body, reading and understanding the body language, and figuring out four beats* (referring to 4/4 meter). *The teacher did not speak for half an hour in the beginning of each of the first five lessons. She just smiled, muttered, and pointed strangely with hands and fingers.* (s4)

> *When I went to music class, the teacher showed hand signals and made strange sounds… It was weird at first, but it became fun pretty quickly…then, after about half an hour the teacher started talking. She said that one can learn very well with the body, even if he did not speak. It was absolutely true. We were totally lost at the beginning of the lesson, but suddenly we learned what the teacher was "saying", and then it went smoothly. Many lessons went like this, but all was fun.* (s17)

Reinforcing the Mind-body Unity

Since embodied learning employs the functions of the mind and body alike, embodied learning can be facilitated through reinforcing the unity of the mind and body (e.g., Juntunen, 2020; also, Westerlund & Juntunen 2005). In this project, this was achieved by focusing students' attention on the 'here and now' of each activity. In addition, imitating the teacher's movements, or responding to music with movement while interacting with other students, required that the students concentrate, be fully present, and pay attention. Whenever attention started to diminish, the teacher refocused the student's attention. This kind of mind-body concentration and capacity to act with attention and awareness is considered crucial for embodied learning (Goldman Schuyler, 2010).

After the exercises, the students were often asked to sit down, think and talk about what was done, why, and what they thought they had learned. Thus, knowledge of pre-reflective experiences was recalled and brought up as an object of reflection, which aimed at naming, conceptualizing, and gaining "deeper" understanding. When language directs attention to one's experience, the words have an immediate meaning for the person using those words (see Juntunen, 2004; Stubley, 2002). Thus, through reflection and verbalization the bodily experiences and embodied learning become more explicit, and reinforce mind-body connection and embodied learning.

Using Body Movement for Musical Learning

As in the exercises, elements of music were practiced and expressed through whole-body movement (locomotion). The students, little by little, started 'feeling the music in the body'—especially the rhythmic elements (tempo, meter, form). It was observed that, at first, the students did not seem comfortable moving with the music in a music classroom. Everyone seemed to be counting, and it was possible to see the students' insecurity in their movement improvisation as well as in the exact performance of musical elements. Through practice, moving became easier and more relaxed, and the students were able to pay attention to their use of space and the quality of their movement, to make eye contact with other students, and to smile or adopt other facial expressions while moving. In addition to the practice of movement, the performance of movements with music in synchrony with others—being able to see and feel the movements of their peers—also supported the internalization of rhythmic elements and the acquisition of the overall rhythmic feeling of the music within the body (often called groove). In phenomenological terms, students were able to *feel* and *tune to* the body movements of others taking place through kinesthetic sensitivity (or *kinesthetic empathy*, Parviainen, 2000, p. 157; also Reynolds & Reason, 2012; and in cognitive theories *motor resonance*, e.g., Uithol et al., 2011).

On the whole, the students' musical (embodied) understanding was supported by aural, visual, and kinesthetic experiences. For example, while studying the 4/4 meter, the teacher improvised music in that meter and asked the students to demonstrate the meter in their movements. This required the students not only to invent the movement that illustrated the meter but also to adjust the movement to the music that was heard. When succeeding in this challenge, the students could both *hear* the meter and *feel* it while moving through the kinesthetic sense. In addition, they could also *see* it realized in other students' (different kinds of) movements, which in turn supported their own rhythmic expression and experience.

During the interviews, the students reported that the movement exercises enabled them to learn music through active involvement (instead of thinking and learning theoretically), and helped them in listening, finding, feeling, knowing, understanding, and remembering the main rhythmic elements of music, such as pulse, tempo, meter, phrase, and form. According to the students, the exercises especially improved their sense of rhythm. The exercises also helped them in finding the connection between the rhythm of the music and that of the movement. The students also considered the bodily exercises to be more fun than learning musical elements through theory and notation. Here are some examples of students' comments regarding learning music through movement:

> *It was easier to learn music through movement than studying notes or theory. (*s1*)*

It was nice to be able to participate actively. (s2)

I think the movement exercises promoted a sense of rhythm and helped to remember. (s10)

My sense of rhythm got much better. (s11)

They improved understanding and sense of rhythm (s3). *I agree.* (s6)

Movement exercises helped rhythmically. (s15)

I learned rhythms. The exercises also helped in analyzing music. (s4).

However, a few students did not find the music-and-movement exercises useful. These students thought that moving with music was only for children and should not be part of a teenager's schooling. This is what they said:

Moving was boring time to time, nothing more than waving hands. (s13)

Movement was kindergarten stuff; didn't feel meaningful. (s14)

We always did the same movements. (s15)

Embodied rhythmic learning became explicit when students started to make the movement composition. During this phase of the project, I was able to closely follow the work of two groups. When the students invented movements and put them together, it seemed easy for them to keep the tempo. It also seemed easy for them to perceive the length of time—to estimate how many movements would fit in a certain period of music. In addition, they were able to use some of the musical terms that had been introduced after music-and-movement activities (such as meter, phrase, beat, rest, etc.).

Creating Social Space for Multimodal Composition and Collaboration

Social space is considered to be an important element of embodied learning for collaborative composition (Miller & McVee, 2013). During the project, forming the group and allowing members to familiarize themselves with one another to feel comfortable were regarded as important. This was done, for example, by stating and memorizing names (through music-and-movement activities), and by constantly changing partners during the music-and-movement activities. It was observed that bodily interaction was a way to encounter 'the other', and a way to find one's place in the group, in relation to others. The bodily interactions

helped form the group and created safe and encouraging interactions between the students. The teacher did not allow any form of mockery toward other students, but rather guided them to learn to laugh at oneself.

In the interviews, the students expressed getting to know the other students as well as feeling comfortable in the group, having a feeling of being accepted, enabled, for example, throwing oneself into the interactive and creative exercises and tasks. Even the ones who did not find body movement meaningful for musical learning recognized that movement exercises supported social integration:

> *I did not know anybody when the school started. Music-and-movement exercises helped getting to know other students.* (s14)

> *I knew some of the students beforehand, but especially changing pairs facilitated getting to know the others.* (s17)

> *In the beginning of the process, the group activities intensified the group spirit. We laughed together as everyone was making mistakes.* (s9)

Furthermore, the students thought that being able to choose their partners for the collaborative composition work with tablets (with the teacher's assistance) had created a comfortable space for composing, as one student stated:

> *It was good we could choose the members of the group. Everything is easier when you know each other well.* (s2)

Preparing, and Practicing Skills for Multimodal Composition

One pedagogical means that supported embodied learning was the preparation prior to composing music and movement. In the preparatory exercises, the students could experience creative engagement, gain trust in their ability to create, and have a broad range of both body movement and musical material built up before composing. This was achieved through versatile vocal and movement exploration and improvisation. For example, by practicing Laban's five basic body actions, the students developed movement vocabulary and facial expressions they could use later when recording movement material for the video, and through movement improvisation they practiced possible combinations of those actions. The material was not used automatically but 'reflectively' (see Parviainen, 2002, p. 20), as seen when students' reworked and modified the Laban movement forms for the movement composition. As students noted in the interviews, improvisation exercises, in turn, made composing feel easy, possible, and less scary. Performing the composed four-bar movement

phrase to others helped them to prepare for the video performance. Here is one comment from the students:

> *Then we started "dancing" and we learned that movements can be created without thinking. We started to come up with movement series and perform them to others.* (s17)

Integrating experience in multimodal composing with tablets

Making the video fostered embodied learning since it required the students to remember, re-experience, apply, and reflect upon what had been performed, experienced, and learned previously in the process. The tablet served as a simple and manageable digital tool for meaning-making and multimodal expression. It was used for music composition, sharing compositions with other students, recording movement material for the video, and editing the video.

Recording the movement material shifted the attention from the feeling of the movements (kinesthetic) to their esthetics (visual). While recording the movement material, the students explored and used different modes of expression, such as images, objects, postures, gestures, and facial expressions, in addition to body movements. In order to make the movements match the composed music, the students either had to recall the music (by inner-hearing or singing the music) or play it from the tablet. It was observed that when exploring the available music material for composition (prepared loops were applied), the students repeated some of the movements practiced earlier to become aware of the rhythmic feeling of them and, *vice versa*, reacted with movement to different grooves found in the application. When recording movement material for the video, it seemed the students had often internalized the pulse, meter, and phrasing of their composed music in their bodies since they only occasionally used playback. Some students sang and hummed the music they had composed, which helped them to master the rhythms and tempo without playing the music from the recording. In cases where the composed movements reflected and matched the composed music, it was easier to combine them in the editing phase, which, according to the students, was the most challenging task.

The students I observed closely had a clear strategy of how to proceed in the video making. For example, in one group, the students first recalled the rhythmic elements they had learned and the movement phrases they had created. Following this, they tried different styles of movement to determine which would best match the composed music. They then planned a series of movements that would go with the rhythms and melody of the composed music. Before starting the recording, they considered the facial expressions, space, props, and background. The students commended the video-making exercise in the following ways:

> *Making the video was difficult at first, but finally it was easy and fun when we started to use the movements we had learned before. Then, we also invented new ones.* (s1)

> *The teacher handed over the tablet, and we started making songs and then invent appropriate moves for it. Previously practiced movement series helped a lot in this.* (s17)

> *The rhythms we practiced in the lesson were useful when composing music and movement.* (s16)

> *The rhythmic exercises helped compose the movement and make the movement match the music. For example, they helped in understanding the structure of the music. So, we divided the music in eight rhythmic sections and composed movement for each of them.* (s17)

According to the students, the use of tablets motivated participation since there was a clear purpose for their use. The students were particularly motivated by the creative assignments that the tool facilitated. They were pleased that multimodal expression was integrated within music instruction, which was a new experience for them. In the project, the use of tablets also facilitated self-regulated work and collaboration in small groups. As Jewitt (2008) states, "success at multimodal learning can be coupled with the ability to be autonomous and self-directed designers of learning experiences" (p. 260). For students who were not familiar with using technological devices, composing and sharing music as well as recording and editing the video was difficult since they first had to learn to use the device and applications. There were also some limitations regarding applications, for example, the application that was used for composing limited the compositional possibilities to using premade loops. In addition, some general technical challenges appeared since the applications did not "communicate" with each other and required the teacher's assistance.

What Was Learned in the Project as a Whole?

During the interview and in the self-assessment writings, the students were asked to reflect upon what they had learned. As the process included many different kinds of student engagement, the students' reflections on learning varied. The issues mentioned by the students covered all activities and included musical knowing (e.g., learning rhythms, musical forms, and analyzing musical structure); learning new movements; learning to express through voice; learning to use movement for composing music; getting to know each other and collaborate; learning to use the tablet and different applications; learning to improvise, create, and compose; learning multimodal expression; and learning how to make videos. It should be noted, however; that it can be difficult to become aware of all areas of learning and their

interconnectedness immediately after finishing a project. Becoming aware of learning and deriving meaning from experience often take time. Here are some examples of students' reflections:

> *It was fun to do the project because we could invent what to do and create the music, and learned to do so. We also learnt to combine movements with musical rhythms, to make them match.* (s3 and s4)

> *In addition to learning how to use technology, we learnt how to tell a story through music and visual images, without words. We also learnt how to collaborate.* (s5 and s6)

> *I have learnt exact rhythms, some other basic elements of music, and how music is constructed. Previously, I did not have much knowledge of musical elements, or skills of music and movement, or in understanding, analyzing, and producing music. I have learnt about all of them.* (s15)

> *I have learnt all kinds of things: how to use applications, how to compose, how to use movement for music composition.* (s12)

> *In music lessons, we have learnt that it is possible to make music without musical instruments.* (s2)

Summary of Findings

To summarize, the following pedagogical means of the project were identified to enhance embodied learning: (1) awakening perception, and reinforcing the mind-body unity; (2) developing an embodied understanding of music (required for composing) through music-and-movement exercises. This made possible, as one student stated; "compos[ing] without thinking", (3) using combinations of senses (visual, auditory, tactile, and kinesthetic) for learning, and various means of expression; (4) promoting interaction and collaboration throughout the process; (5) approaching composition through explorative improvisation exercises; and importantly, (6) nurturing positive experiences and social cohesion. Together, these aspects meant students were treated as whole beings, and learning was approached from a holistic view, implying that the roles of body, mind, and emotions alike were acknowledged as essential for learning (see Stolz, 2015). Embodied learning was promoted by integrating all of the different exercises, actions, feelings, and thinking in a meaningful way so the learning process would form a continuum, and everything previously learned could be used in the upcoming tasks.

On the other hand, multimodal composition, that is, making the music video, in itself enhanced embodied learning by integrating the various activities, skills, and experiences gained during the process, and by obliging the students to recall, remember, and re-experience the earlier activities, expressions, and experiences. It also made explicit some, but not necessarily all, areas of learning. By watching their own videos, the students could re-experience some parts of the learning processes, which further reinforced learning.

Concluding Discussions

There is an increasing body of evidence suggesting the importance of bodily involvement and embodied experiences for learning. According to the students in this study, the movement activities fostered learning in music and enabled positive interaction with all students, and thus supported social cohesion. These experiences, in turn, were highly correlated with positive learning experiences. Thus, the study resonates with the idea that sensitivity and receptivity to movement may be important for intersubjectivity (Rabinowitch et al., 2012). However, it seems that in music teaching, and in teaching in general, movement and other kinds of bodily engagement are still seldom applied. As Miller and McVee (2013) suggest, "schools focus too much on the cognitive and treat students as though they only have brains and not bodies" (p. xi).

One reason for this might be that it can be challenging for a teacher to start applying body movement or similar activities in teaching without having had personal learning experiences with such approaches. Another reason, which became explicit in the student interview data of this study, might be that learning through movement and from experience is often considered to be childish and a less valid form of learning and understanding when compared with learning through solely intellectual processes. Embodied learning is also difficult to recognize and talk about since much of it takes place tacitly and goes beyond what can be thought and verbally articulated. In addition, there still seems to be a strong belief in 'learning styles', which regards, for example, kinesthetic learning being suitable only for certain learners, despite a lack of support from recent research (e.g., Odendaal, 2013). Instead, as Kress and Bezemer (2015) among others suggest, in the learner's engagement with the learning environment, learning is "potentially based on all modes and all modes in conjunction" (p. 156). Hence, multimodality offers teachers the possibility to reflect upon their pedagogical use of their bodies (Jewitt, 2008). It also challenges teachers to search for ways in which different (sensory) modalities and cross-modality can be activated and used to make learning more multisensory and comprehensive. In music teaching multimodal learning can actually be applied naturally since music can be approached aurally, visually, and kinesthetically through listening, reading music, singing, playing instruments, and moving.

The primary principles of the implementation of embodied learning include, as Kosmas and others (2019) suggest, "the sensorimotor activity, the relevance of gestures to the theme that is to be reproduced, and the emotional involvement of the participant during the entire process" (p. 61). In my understanding, embodied learning can, however, be further enhanced through pedagogical activities such as guiding students to be attentive, observe, and become aware as well as to reflect upon and share experiences (Juntunen 2020). Creating conditions for embodied learning can imply bodily engagement and interaction, but can also include using immersive technologies, in which embodiment is performed in virtual or augmented reality (mixed reality) (e.g., Lindgren & Johnson-Glenberg, 2013), combining evidence from philosophical, educational, and neuroscientific research. The key motivation for incorporating educational technologies into classroom activities is and should be the desire to improve student engagement and learning (Sankey et al., 2010). In line with earlier studies (e.g., Karsenti & Fievez, 2013), this study shows that the use of technology, in this case limited to the use of tablets, did motivate student's engagement, and multimodal composition offered a meaningful way to use technology (see also Pitts & Kwami, 2002; Savage, 2005).

The tablet, as an easily accessible tool for recording and editing sound and video, played an important role in multimodal expression in the project. Although earlier studies have identified the positive influences of multimodal engagement as such, as discussed earlier in this article, multimodal expression (making the music video) in this project was integrated with the body movement and intersubjective engagement. This made participation and learning experientially different from and presumably more meaningful and compelling for students than a music lesson with separate movement or multimodal engagement. The use of tablets also enabled self-regulated work and collaboration (see Juntunen, 2018). Collaboration in learning in turn inspired participation, which has been suggested in previous studies among teenagers (Rusinek, 2007).

As stated earlier, the use of technology is, in some contexts, criticized for lacking contact with the bodily, kinesthetic, and visual-spatial perception (e.g., Parviainen, 2006). In this project, the teacher's pedagogical approach enabled the integration of technology with bodily/embodied processes and experiences. According to Jewitt (2009; 2008), the multimodal facilities of digital technologies enable image, sound, and movement to enter the classroom and the communicational landscape in new and significant ways. Even so, as can be suggested based on this study, bodily interaction in a classroom is an important means of nonverbal communication, and a means to encounter the other (also Anttila, 2019) and become acquainted with other students and oneself, among other things. Regarding research, there is need for future investigations to examine and popularize a variety of ways to enhance embodied learning, in arts education and beyond.

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About the Author

Marja-Leena Juntunen works as Professor of Music Education at the Sibelius Academy, University of the Arts Helsinki, Finland. She holds a Dalcroze License from Carnegie Mellon University and has given Dalcroze inspired workshops and lectures around the world. Her research interest areas include, among other things, embodiment and Dalcroze pedagogy as well as music education in school, higher education and teacher education. She has published widely in international research journals and is a contributor to anthologies such as Handbook of Assessment Policy and Practice in Music Education and Approaches to Teaching General Music: Methods, Issues, and Viewpoints. She has also published teaching materials and textbooks. She has served as a review reader in several research journals. She is a researcher and group leader in the current ArtsEqual research initiative (www.artsequal.fi).