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Fostering Children's Rhythm Skills through Creative Interactions: An Application of the Cognitive Apprenticeship Model to Group Improvisation

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Abstract

This chapter illustrates a teaching/learning process for enhancing rhythmic understanding and skills through group improvisation, as it has been experienced by the teacher-researcher with a small group of 5-7-year-old pupils in the context of a doctoral research study on children's interactions in creative music making.

The focus is, on the one hand, on *what* these children have learnt, specifically the kind of interactive skills that they developed – synchronising and entraining to each other, and being able to consistently produce and coordinate rhythmic figures on a pulse. On the other hand, it is relevant to see *how* they have learnt it: based on the model of cognitive apprenticeship, the subsequent phases of the teaching pathway are described, as a successful example of a social constructivist approach to musical creativity.

Researching children's interactions in creative music-making activities

In the primary school curricula of many countries it is explicitly recommended to include improvising and composing activities in the music curriculum. Thus, group musical creativity has emerged as an essential theme for both practice and research. This chapter aims to illustrate some of the results of the pilot study that I, as a PhD student of the University of Exeter under the supervision of Sarah Hennessy, carried out with a group of 5-7 year-old children between January and April 2012 in a private music school in Rome, Italy. The focus of the overall research study is on children's musical creativity, and in particular on the nature and value of children's interactions in the context of creative music activities, the factors that influence their collaborative work, and the meanings that they attribute to the experience of creating music in group. My broad aim as a teacher-researcher is to develop a theoretical-methodological framework for understanding children's creative music-making in educational contexts. This study can be characterised as interpretative, naturalistic research, based on a social constructivist and pragmatist stance. Methods include participant observation, analysis of video-recorded musical creative interactions, analysis of musical artefacts, and interviews and drawings, as means to elicit children's perceptions of their own experience.

The aim of the pilot study was in the first place to explore the methodology and the methods – coping with the practicalities of videoing and documenting – and the theoretical issues linked to these. More broadly, the pilot was designed to set the research process in motion, to build a theoretical framework relevant to the theme, find connections between theory and practice, and identify some lines of thought about what happens when children interact and invent music together. I consider the following report and related considerations as a provisional snapshot of an evolving picture, provisional not only because these are the first tentative results of a doctoral study, but also because the kind of knowledge that can be produced by the interpretative, real-world inquiry of a teacher-researcher is by definition context-related, inescapably incomplete and partial, and continuously re-constructed and re-defined. The wish is that the end-result might offer to others (teachers or researchers) a trustworthy and possibly useful account about what I find to be an interesting issue.

The pilot group consisted of four children: two sisters – Anna (5½ years) a very good observer, and Silvia, 7, who had already made two years of music in our school – and two male twins, Sandro and Tonio,

6, both very lively, whose main motive to participate was "to play the drums". All of them enjoyed a rich musical background in their families. We had weekly sessions of an hour from October 2011 until May 2012. A teaching assistant supported me in conducting the activities. Largely orientated to the Orff-Schulwerk approach (Haselbach, 1990), the sessions were centred on the creative use of percussion instruments (drums, Orff-instruments, other percussion instruments) and included a variety of activities: imitation and invention of rhythm patterns inspired by Gordon's Music Learning Theory (Gordon, 1997), playful approaches to the basics of instrumental technique, much movement and musical games, and some singing. We experimented with an array of different creative tasks, ranging from extra-musical stimuli – e.g. playing soundscapes and finding ways to associate sounds with imagery or narrative – to musical rules, which guided children in exploring different families of instruments or composing in pairs.

We also undertook over a period of about three months a series of pair and group improvisations about free-rhythm-on-the-pulse, which ultimately led to the construction of a piece that the children performed for the parents. In this chapter I examine more closely this latter activity, and specifically the kind of musical skills that the children were developing and the features of the teaching/learning process that we followed.

Learning goal: Coordinating rhythm and meter in improvisation

A crucial turning point in the rhythmical growth of children is when they start to coordinate surface and deep structure, i.e. they can synchronise rhythm figures with the underlying pulse/meter, eg. coordinating the action of walking on the spot with chanting or playing rhythms.

surface structure	↕	groupings - rhythmic figures
deep structure		pulse / meter

Table 1: The syntactical organization of rhythm (based on Gordon, 1997, p.108 and p.162)

In my experience, this transition towards a higher-level perception of the syntactical organisation of music mostly occurs in a natural way when children are between 5 and 7 years old. As a music teacher, one of my goals is to support and possibly accelerate this important step forward in their musical development, as it opens up significant further possibilities of understanding, making, and enjoying music. For example, acquiring this skill points towards keeping a steady beat while playing rhythm phrases and, looking further ahead, it is the necessary prerequisite for performing rhythm polyphony and African and Latin American layered ostinati.

The children of this group – with individual differences – still played rhythms as if they were 'floating', without being firmly anchored to a regular pulse. Or else they tended to concentrate on the meter itself, playing almost only the macrobeats and without being able to articulate some more elaborate rhythm patterns, let alone rhythm phrases. My impression was that they were still in the process of shifting towards this integration of the basic meter and the superimposed rhythm motifs. Since the beginning of the school year we had been doing activities so that each child could develop this ability. Among other things, for example, we had regularly worked on the imitation and invention of rhythm patterns, using the voice (expressing a rhythm in 4/4 or 12/8 with a neutral syllable "pa", *a la* Gordon) and associating it to various kinds of fluent and pulsating movement or body percussion patterns. The idea was to expand children's rhythmic vocabulary and at the same time to get them used to coordinating two differentiated levels, in this case that of the vocal rhythm and that of the motor pattern accompanying it. The lack of this coordination between rhythm and underlying pulse was clearly to be seen, as shown in some of the video recordings, in the case of the youngest member of the group, Anna, 5½, especially when she was playing the instruments (which requires an added set of bodily-cognitive operations). When, for example, we asked the children to invent a rhythm on the djembe and to repeat it four times, she could perform it so that the groupings were well-defined and consistent over the four repetitions, yet it was obvious that the rhythm was not grounded on the stable flow of the beat. It did not 'groove'.

Reflecting and trying to understand the (implicit) theoretical assumptions on which we were basing our action as teachers, I realised that what we were adopting was a cognitive-developmental, Piagetian-informed way of looking at the issue (see Paananen, 2006, and Gordon, 1997). We were conceiving of these two levels – rhythm and pulse – as occurring *within the individual* player.

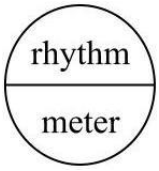

Figure 1: Coordination between rhythm and meter as a property of the individual player

Consequently, we were working with each single child on parallel tracks, so to say, and were not exploiting the potential of the group and of the interplay within the group. We had to look for other kinds of activities – in addition to the (effective) ones which we were already doing – which could enhance children's rhythm skills by activating new communication and interaction routes among the members of the group. That was the moment in which my observing, planning, and acting as a teacher started to shift towards a social constructivist/sociocultural approach (Fleer & Robbins, 2004; Palincsar, 1998; Rogoff, 1990, 2003).

Learning to interact rhythmically with others

The attempt was to situate this learning process in a creative group context. Adopting a social constructivist perspective, I interpreted the coordination between surface and deep structures as *the ability to interact with a partner*, whereby one plays the pulse, and the other plays the rhythms on it, forming an integrated whole. This way the musical functions were made clearly perceivable – were 'embodied' - in that they were enacted by the partners through different interactive roles.

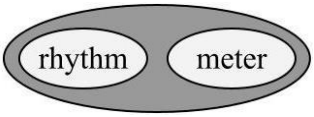

Figure 2: Coordination between rhythm and meter as a property of the interaction between two players

Thus, we explored various ways to apply this specific context of children's creative music making to the notions of the zone of proximal development (Vygotsky, 1978), of scaffolding (Wood, Bruner, & Ross, 1976), and more broadly the pedagogical approach proposed by the cognitive apprenticeship model (Brown, Collins, & Duguid, 1989; Collins, Brown, & Newman, 1987). The perspective of cognitive apprenticeship appears to be particularly fruitful with regard to music learning (Elliott, 1995, p.74), and Vygotsky's ideas have already been found relevant to teaching for creativity in music education (see Hennessy, 1998). What is distinctive in the case reported in this chapter is the age range of the pupils and the application to a group interactive process. It must also be observed that the learning pathway that is portrayed here as a clearly structured process is actually a retrospective reading of what was in practice a partly intuitive, partly conscious process of search and discovery, where both children and teachers were engaged in co-constructing new kinds of knowledge, respectively as apprentice-musicians and as domain-experts guiding them. The openness of cognitive apprenticeship was appropriate in our case: as Collins, Brown, and Holum (1991) remark, "cognitive apprenticeship is not a model of teaching that gives teachers a packaged formula for instruction. Instead, it is an instructional paradigm for teaching". In other words it is a theoretical framework or a set of teaching strategies which has to be concretely adapted to the particular learning circumstances in which it is applied. Importantly, this approach proves to be useful for more complex tasks implying high-order cognitive and metacognitive processes – such as the creative activities we had in mind – rather than for direct instruction or rote learning.

A further reason for the applicability of the cognitive apprenticeship model to the context described here is the emphasis that it places on the role of the group and of collaborative learning: "If learning is a process of enculturating that is supported in part through social interaction and the circulation of narrative, groups of practitioners are particularly important, for it is only within groups that social interaction and conversation can take place" (Brown et al., 1989, p. 40). Working in/as a group is a central feature in this approach, because the group gives rise to synergies that may otherwise not come about. Also, the group provides the network of relationships within which conceptualisations and behaviours can be modelled, articulated, discussed or reflected on, resulting in higher-level cognitive and metacognitive learning. It is through the members' active participation in the group – meant as 'community of learners' (Rogoff, 1994) – that their knowledge and skills are co-constructed as a set of culturally situated tools. Indeed, the pedagogical potential of collective problem solving and of group work is fully acknowledged by the cognitive apprenticeship model, which in this sense shares with other social constructivist approaches the focus on social interaction as an essential factor in learning and cognitive development.

According to cognitive apprenticeship, three main phases of the learning process can be distinguished: modelling, coaching/scaffolding, and fading. In the following, I describe in some detail the successive learning steps that we took, interpreting what happened as an *apprenticeship in thinking* (creatively, in interaction with others, in music).

Modelling the improvisational idea

Modelling is when the teacher provides an example of expert performance of the task and at the same time makes the internal reasoning explicit by talking aloud about the considerations he makes or the decisions he takes, possibly making use of labels or imagery to indicate specific aspects of the activity. This verbalisation added to the demonstration helps the learner comprehend the overall problem solving process and build a conceptual model of how to carry out the task. In cognitive apprenticeship the central point is in 'making thinking visible' (Collins et al., 1991).

With these children, the teaching assistant and I demonstrated and explained how the task could be solved, also directly instructing them about the appropriate strategies to use. One of us would start playing a basic meter on the djembe, the other had to listen, look, start to swing on the beat, and then improvise a few different rhythms, checking at each point that he was maintaining the connection to the pulse provided by the partner. Then we would swap roles. While we were playing the rule we were kind of thinking out loud, so as to make the process of reflection and meta-cognition explicit. It was also important to introduce the concepts of 'pulse' and 'rhythm' by referring to the actions we were doing and emphasising the labels we were using to define them. It is important to notice that what we were modelling was a procedure – *how* they had to think and act in order to play according to the rule – and not *what* exactly they had to play – the rhythms, indeed, could be improvised each time differently. We wanted children to understand this particular way of interacting in music, of holding a dialogue in the language of music. As a pedagogical strategy, modelling is based on the principle of observation and imitation: in simple terms, the teacher shows, and the learner replicates. However, given the creative nature of this particular task, the purpose of modelling could not have been, so to say, senseless mimicry. Indeed, we did not want them to reproduce a given musical object, but to learn how to organise extemporaneously a musical structure, respecting a specific musical syntax. In sum, the goal of this initial phase of the learning process was to foster their deep understanding of the activity as a whole, including the underlying thought processes and procedural strategies, prior to actually tackling it in practice.

Coaching and scaffolding

In the subsequent phases of the teaching process, coaching and scaffolding, pupils receive assistance and support, wherever necessary, in their practical attempts to cope with the task. The teacher's role is to structure the task – in terms of arranging the successive steps to be taken as well as organising possible materials to be used – and to monitor the pupils' activity, offering suggestions and feedback, and pointing out specific problems or issues. The concept of scaffolding clarifies the role of the teacher in accompanying the child in his movement within his zone of proximal development, that is the distance between the actual learner's ability to solve a problem independently and the learner's potential level of achievement when

given guidance by an adult or in collaboration with more expert peers (Vygotsky, 1978). Scaffolding entails a highly receptive and interactive, rather than directive attitude on the part of the teacher: given a specific task that the child is learning to solve, the teacher has to fit the level of support and guidance to the child's potential ability to perform at first only some of the component cognitive or practical operations involved in the task, up to the point in which she becomes able to master the whole problem solving process on her own. In this sense, scaffolding is a "learner-centred strategy", which has to be "directed appropriately at the learner's current ability level. In other words, it must occur within the learner's ZPD" (Dennen, 2004, p. 815). The relevance of the teacher's cognitive skills and experience in interpreting the learner's position at each moment has to be underscored: It is the teacher's awareness of the cognitive functioning of the learner that eventually makes the interchange fruitful. This ability on part of the teacher – as Wood, Bruner, and Ross (1976) claim – is "crucial to the transactional nature of tutoring" (p. 97), because the sensitivity to where the learner is at constitutes the premise for a productive interaction within the relationship. At the same time, in a sociocultural perspective the idea of an expert assisting the novice does not imply a passive role of the latter: On the contrary, both participants contribute to the learning process and manage the interaction, actively engaging in what has to be considered as a dialogue and a mutual collaboration (Rogoff, 1990).

After having observed a model of what the musical rule was like, each child practiced it interacting individually with one of us teachers: sitting on the drums in front of each other, first the child played the pulse while the teacher improvised some rhythms on it, then they swapped roles, and it was the child who had to invent a series of rhythm patterns on the instrument. Such an improvisation would last no longer than 60-90 seconds. Meanwhile the others were watching attentively. By repeating these kinds of dialogues over a few sessions and also by observing what the others were doing when it was their turn to improvise, the children fully grasped the sense of the activity and appeared to be motivated by the challenges involved in it. The video recordings show some moments of intense concentration between the playing partners. At the end of each improvisation we tried to elicit children's own comments as a form of self-assessment, and in some cases provided some verbal feedback about what had happened – though at their age too much talking is often just useless and, beyond that, given that "music making is essentially a matter of procedural knowledge" (Elliott, 1995, p. 53), words and conceptualisations are no more than means to an end, that is enhancing musical thinking and performing. Thus, in order to support this understanding-in-action, the teacher's scaffolding function was working much more at a nonverbal level during the interaction itself, as a kind of embodied-musical communication: for example, we saw that it was convenient for the teacher to play on the child's pulse a sufficient variety of rhythms at the right level of difficulty, so as to give an accessible model for the child's subsequent invention. Or at times the teacher was almost instinctively adjusting his own pulse to the child's still unstable rhythms in order to keep the improvisation on track. Nonverbal cues – nodding with the head, maintaining eye-contact, lightly swinging with the body to visually emphasise the beat, smiling – were also essential in creating attunement and musical intersubjectivity with the child. As can be abstracted from this experience, the notion of scaffolding in music education refers to a 'multimodal' instructional strategy which can take many different forms, extending from purely musical, to nonverbal, up to verbal communication.

I have to make a short digression at this point, introducing a promising perspective from which to look at the kinds of rhythm interaction illustrated here, that of 'entrainment'. In broad terms, the concept of entrainment refers to the phenomenon in which two or more independent rhythmic processes synchronize with each other (Clayton, Sager, & Will, 2004). In a biomusicological sense, entrainment can be defined as "spatiotemporal coordination resulting from rhythmic responsiveness" and is based upon "the abilities to connect the detection and production of rhythmic information" (Phillips-Silver, Aktipis, & Bryant, 2010, p. 7). Analysing the embodied-cognitive processes that the children of this study were going through, their entrainment to an external rhythm, that of the teacher or of their classmates, involved 1) perceiving regularities in the flow of the temporal events, i.e. forming expectations and anticipations with regard to an inferred pulse or meter, 2) synchronising their bodily movements to the perceived auditory stimulus in order to produce a coherent set of sounds on the instrument, and 3) recursively adjusting and correcting their own motor output to the incoming rhythmic information, including micro- or macro-deviations, perturbations, or ambiguities in the music. Phillips-Silver et al. (2010, p. 4) suggest that this ability to perceive and synchronise to rhythmic music rests on the integration of different sensory modalities, namely the auditory, the motor, and the vestibular systems (the latter being activated, for example, while rocking, walking, or

dancing to the music). To these, in my experience, I would add the visual system as an essential component of this crossmodal integration of beat-related perceptions – at least with children, it is easier to keep time together if we look at each other. Much of the preparatory activities that we had done with the children, as well as the improvisations described here, included in various ways the combination of more than one sensory modality, as a strategy to reinforce through redundancy the exchange of rhythmic information. Based on the perspective only briefly hinted at here, the learning goal 'fostering–rhythm-skills' mentioned in the title of this chapter could just as well be phrased as 'enhancing-entrainment-skills'. As a last remark, entrainment is deeply related to social interaction – it has had an important role in our evolutionary history as human beings who have learnt to coordinate their actions (Merker, Madison, & Eckerdal, 2009). Rhythm seems to be much more an interpersonal/group experience than an individual property. The concept of entrainment, thus, indirectly supports the advantage of an educational approach that is centred on the social, interactive aspects of 'musicking'.

Towards independent practice: the group pulse

The next step with the children was to let them try out the same rule in pairs. Having acquired through the interaction with the teacher sufficient understanding of how to play the rule, they were ready to improvise with another child. In cognitive apprenticeship terms, this strategy is called 'fading', in that the teacher gradually steps back and removes the scaffolding action in order to give space to the children's autonomous performance.

In the first attempts they were not yet able to adjust their rather unstable pulse and improvisatory actions to each other. Adequate motoric skills and auto-regulatory mechanisms were still lacking. Over a relatively short time, however, they became increasingly expert, up to the point where they could assume full responsibility for the task. They were "internalising the rule", in Vygotskyan terms.

The subsequent move was then to let all four children play together. The culmination of this process was a long and successful improvisation (5 minutes!), which I called "free rhythm on pulse". The rule is that the teacher (light grey circle in the scheme below) keeps a supportive pulse on the djembe; one soloist (dark circle) at a time around the circle improvises free rhythms on it loudly, while the others (white circles) accompany softly, playing the pulse or also improvising on it. The rule is about the beginning fundamental coordination of deep structures (macro- and micro-beats) and surface structures (rhythms/groupings, proto-phrases) within a creative group process. Tonio and Sandro were playing darbukkas, Silvia a headless tambourine, and Anna a metallophone.

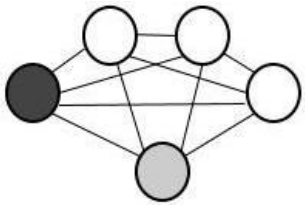

Figure 3: A graphical representation of the improvisational rule "free rhythm on pulse"

Here the scaffolding role of the teacher reduced itself to playing a delicate meter on the drum which served as a common orientation for the children, providing the minimum necessary connective tissue to enable them to maintain the rhythmic alignment. The striking feature of this improvisation was the alternating going out from and coming back to the common metrical structure. In spite of the fact that there were often individual deviations from the pulse – there was also a lot of exploration and free risk-taking – the children were sufficiently synchronising to each other and succeeded in co-constructing for the first time here a dynamic group pulse, that they were able to maintain throughout the improvisation. Having learnt what strategies to use thanks to the previous phases of work, they could now regularly check and recognise whether they were out of phase, and whenever necessary they could stop, listen to and watch the others (or me, as a distant co-player), reconnect to the pulse, and start again improvising. As long as there was 'enough' group pulse in the interaction among them, it was possible to go on playing and freely develop further ideas. And they enjoyed it.

The dynamic character of the group pulse in this improvisation, in other words the unstable regularity of the beat emerging from the group interaction, has to do with the fact that in reality synchronisation occurs up to a certain degree, and is never absolute in mathematical terms. Quantitatively speaking, time series analysis of expert musicians' rhythms shows that precision in time keeping is a relative concept, and that the tempo of the pulse tends to fluctuate. In fact, what is perceived as evenly paced is within certain limits slightly irregular, so much so that Allgayer-Kaufmann (In Clayton et al., 2004, p. 46) talks about a "synchronisation bandwidth", a sort of acceptability threshold within which we consider the music as in time. In this improvisation the synchronisation bandwidth was at moments rather large, I would judge, even resulting in apparently chaotic phases. Nonetheless it was sufficiently defined for the purpose, which was in turns to invent rhythms on a common pulse. And given the children's ability to turn back to the collective meter and resume their playing, it would seem right to say that they were well entraining and synchronising to each other. As Clayton et al. (2004) claim: "In order to identify entrainment one needs to examine perturbations or transitions of the synchronization process; only if synchronization is re-established after these disturbances [...] does it seem justified to describe the interaction between the oscillators [here the improvising children] as entrainment" (p. 27). So, the point was not so much the discrepancies or the mistakes (we did not use the word), but the ability to dive back into the flow of the group rhythms.

This improvisation was a moment of flow for me personally and, I think, for the children as well: in Csikszentmihaly's terms (1996), there was a good balance between the challenge posed by the task and the children's emerging skills at that point in time. Their bodily involvement, the quality of the concentration, the mutual listening, their overall engagement and their expressions of satisfaction at the end of the improvisation denoted that they had lived and perceived it as a meaningful experience.

From the free improvisation to a piece: tackling issues of form and structure

Later on we started to work on some possibilities to structure this musical material. I am not reporting here in detail some intermediate steps that we took. The final form was A (loud), B (soft, a-metrical), A (loud), *diminuendo*, and a last stroke all together. Using a simple graphical notation was helpful in making clear to the children what macro-structures they were playing at each moment. The interesting point was that, given this basic architecture of the piece, the musical ideas *inside the boxes* could be improvised differently each time. However, by repeatedly playing this piece over two-three sessions the children had to a certain extent selected some preferred ways to play. Thus, the resulting impro-composed piece – Germans would say *Gestaltung* – rested on an ideal ratio between freedom/openness and constraint/closure, allowing children to go on experimenting up to the ultimate performance, but at the same time giving them enough structure to exactly know what they were doing and where they were situated in relation to the shared plan of the piece.

As a concluding consideration about the overall learning pathway described here, it must be said that this, rather than a linear, sequential process, resembled much more a spiral or zigzag progression, with each phase being proposed at different levels over a series of sessions. The children themselves were, so to say, often unpredictable – sometimes they were making sudden leaps forward, and in other moments they seemed to regress to previous learning phases that they had apparently not yet fully mastered.

Values

From a wider perspective, the cultural and ethical values associated with this kind of creative learning are: respect for everybody's ideas, inclusion, cooperation, democracy, equity, freedom, and responsibility. As Burnard (2002, p. 168) rightly claims: "The value of social bonding and affirmation of individual identity, where every child can participate in immediate creation and take risks within a group, is what uniquely characterises the experience of group improvisation". Fostering these children's creative skills entailed looking at them as active members of a community of inquiry, where knowledge was a set of cognitive tools and shared practices which were negotiated and co-constructed through collaborative interactions and collective problem solving. These children were developing their skills as legitimate participants in a community of practice (Lave & Wenger, 1991), that of a small group of pupils in a private music school in a middle-class area of Rome. In cognitive apprenticeship terms, their learning was situated in the real-world context of coherent and purposeful, i.e. authentic activities: not (only) doing technical

exercises, or practicing solfege, or reproducing pre-conceived pieces, but shaping their own musical ideas and performing their own pieces of music. What they experienced here, alongside and beyond learning as transmission/acquisition, was learning as participation/transformation/participatory appropriation (Rogoff, 1994 and, 2008; Sfard, 1998).

Creative learning has much to do with authenticity and identity, as well as with empowerment and autonomy. The particular emphasis that the cognitive apprenticeship model places on *learning how to learn* and on the learner himself as the main protagonist of his own process of growth makes it particularly suitable for applying it to group creativity in music, not only as a pedagogical technique, but much more as a *mindset* and an *ethical stance* in education.

Concluding

In this presentation I have examined a model of creative pathway, aiming to foster children's rhythm skills through group improvisation. The central idea that I have explored is that musical functions – the logic of thinking rhythmically in music – can be represented as social, interactive roles. The experience reported here shows how the coordination of pulse and superimposed rhythms can be experienced and internalised through the interaction with other players within an improvisational process.

A second idea is that such a teaching/learning pathway can effectively be structured according to the cognitive apprenticeship model, which can offer both theoretical orientations and valuable pedagogical guidelines for nurturing children's creative learning in music.

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