Listening and body movement

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Abstract Many recent studies argue about the intertwined relation between motor knowledge and the mind of the listener or performer (Leman, 2007; 2010; Abril, 2011). According to some implications of the relationship between music and movement explored in previous studies, (Piras 2013; 2014; Piras, Fortuna & Maffioli 2015; 2016; 2017) the present research investigates the role of movement during the activities of listening according to Jaques-Dalcroze and Laban theories. L.M.A. (Laban Movement Analysis) focused on the motion factors of Time, Weight, Space, Flow (Laban, 1948). The starting questions of the present article are the following: Are there differences among the body performances with and without an object or a musical instrument? If so, what kind of differences could be noted? Could these differences be referred to the dalcrozian thought about the correspondence between Music and Movement, and to the Laban's motion factors? Could they be realized through a didactic activity useful both for musicians and dancers, starting from this kind of path? The method used to answer the question was:
A sample composed of 4 children, aged 8, two of them studying music, and the other two studying dance, followed a common procedure. They were asked to perform music with movement in the following modes: (i) Only with movement; (ii) Movement with an object (a foulard); (iii) Movement with a little percussion instrument; (iv) Only movement.
Questions were given to the children dealing with their way of thinking and interpreting music. The results confirm a starting hypothesis that an object could change a movement performance likewise in body activity with its musical relationship. The ability of the subjects to expand their vocabulary of movement according to its objectives, is manifested, together with the exploration of musical phrasing and the pleasure of movement in a Flow experience way.

Keywords body movement; motivation; flow; Jaques-Dalcroze; Laban

Introduction

Body movement is found to have a central role in musical understanding from many points of view: first of all, the neurological research gives us significant elements to corroborate this assumption, emphasizing the link between motor and auditory system in the human brain (Janata & Grafton, 2003; Repp, 2006; Sacks, 2007).
In the field of music education, recent studies argue about the intertwined relation with the motor knowledge and the mind of the listener or performer, where the body should be considered the natural mediator between the mind and the physical musical environment, effective also in an embodied learning process (Leman, 2008; 2010; 2012; Abril, 2011; Davidson, 2005; 2012; Kerchner, 2014).
Beyond these bases, it's important to stress the Jaques-Dalcroze and the Laban thought about movement and music, especially from the expressivity point of view (Seitz, 2005).
Starting from this background, interesting questions emerge about the relationship between

music and movement, as well as the body-mind relationship in a holistic sense, and first of all, how these relationships are intertwined with a real and intrinsic learning process.
In the recent research we carried out (Piras, 2014; Piras, Fortuna & Maffioli, 2015; 2016; 2017), addressed on the correspondence between music and body interpretation, analyzed according to the Jaques Dalcroze's assumptions (1921) and the L.M.A - Laban Movement Analysis-, (Laban, 1948), it was observed a significant improvement in movement achievement, in awareness in listening to and in understanding music parameters. Beyond this, we noticed an evident enthusiasm and a really wellbeing state in relation to the activity proposed and to the goal to pursue, that we analyzed and recognized in Flow experience terms (Csikszentmihalyi, 1975; 1990).
For the reasons above, the present research focuses and analyzes the role of movement in learning musical activities, with the variable of the use of an object, following the assumption that all tools amplify bodily functions (Moore, Yamamoto, 2011). This view comes under the extended concept of the constructivism in education field, in a learning and engaging process, in a discovering learner-oriented way of achievement of knowledge and competences, (Vygotsky, 1962; 1982; Piaget, 1970; 1977; 1987; Inhelder, Sinclair & Bovet; 1974; Bruner, 1986; Bruner & Ratner, 1978) by focusing on integrity of the learner as a unity of mind, body and emotions (Gardner, 1993; Damasio, 1994; Leman, 2008; Abril, 2011).

1. Body and mind: A brief overview

It's well known that the paradigm of mind supremacy over body influenced the western culture for a long time. At the beginning of the 1900s, simultaneously to the birth of the psychological and psychoanalytic theories, a strong change in the philosophical perspective takes pace, and it involves the concept of body (Sarsini, 2003).
Body begins to be considered a condition for the process of human knowledge, with the assumptions of Merleau– Ponty (1945), the important exponent of the French phenomenology.
According to Merleau – Ponty the dual essence has passed, because he put the body in direct relationship with the world. The body is an "espace expressif ", and is also "l'origine de tous les espaces expressifs" (p .171).
In this way, the body becomes a leading actor of knowledge and learning.
We can easily place beside the original Marleau- Ponty thesis, the recent theories of embodied cognition (Varela, F. J. Thompson, E. T., Rosch, E. 1992), particularly in relation to music (Leman, 2008; 2010; 2012; Abril, 2011).
Neurosciences agree with this anti-dualism thesis; Damasio (1996) states that our knowledge takes place from maps related to what happens in our system, around our system and with our system. In this way, Damasio assumes that it's wrong to suppose that only mind can think. Starting from the beginning of the twentieth century, there was also an explosion of interest to the human development also in the educational perspective.
In this frame, it's important to consider, among the others, Emile Jaques-Dalcroze's (1865-1950) and Rudolf Laban's (1879- 1958) work in the education field. In both works the role of the body is central. The first one focuses on the body in a music perspective, the second one in a dance and movement perspective.
Their theories express a holistic vision of knowledge experience, associated to an idea of expressive and creative universe.
Following Dalcroze theories, music comprehension starts from body actions and is rooted in a sensory experience. "Le but de toute éducation est de mettre les élèves, à la fin de leurs études, à même dire non seulement je sais mai aussi J'éprouve" (1981, p. 85. "the goal of education is to bring students, at the end of their studies, to not only state I know but also I

feel).
It's very interesting to note here that the verb "éprouver" used by Dalcroze has in French a double meaning: "try out" and "feel and emotion or a sensation".
Following the Laban theories, there isn't any kind of exterior expression of human that is not a mirror of an interior one. Laban argues this thesis is in accord with Delsarte theories (Stebbins, 2012) in a full personal manner.
Recent theories show many aspects of the mind-body unity from a psychological and pedagogical point of view. Gardner (1993), defines the Bodily-Kinaesthetic Intelligence - "Body Smart"-; this intelligence involves a variety of physical skills, a sense of timing and perfection of skills through mind-body union.
Juntunen & Westerlung (2001) highlight the relationship between Dalcroze, Dewey (1938, 1951) and Elliot (1995) theories related to the idea that education should start from action and personal experience; from "learning by doing" of Dewey (1938) to "thinking-in- action" and "knowing-in-action" of Elliot (1995) and Regelski (2005), up to understand music through the body following the Dalcroze theory.
These neuroscientific conceptions are like philosophical theories about body conception: "The body is where the correlation between subject and object takes place; without that, there is neither intellect nor soul which can understand anything of the world. Recovering the body means rejecting the conscience formalism to substitute it with sensorial communication, without which it's neither possible to inhabit the world nor to think with a priori of reason" (Galimberti, 2008; 2009 pp.119-123).

2. Constructivism in music education activities
In the brief overview above, we stressed some elements that we can recognize as common in the active approach of the learning and knowledge theories based on an ideal mind-body union and in the constructivism theories of knowledge.
It's known that many types of application and interpretation of constructivism in education exist, and we can summarize the essential basic assumptions of these theories in: learning through experience, active interaction with the world, learners' construction of new understanding utilizing elements of knowledge that they already have; learning as an ever active process.
These assumptions derived from the historical theorization of social and cognitive constructivism, where there is not only a way to construct the knowledge, also and foremost, because each individual reconstruction is the understandings in response to environmental stimuli.
Although constructivism is a theory of learning and knowledge, a constructivism approach in teaching practice is clearly recognizable, and several researches explore this aspect in music teaching (Webster, 2011; Scott, 2006).
The student is required to access their pre-existing knowledge and beliefs and to link those to the new experiences (Ausubel, 1963; Ausubel & Novak 1978; Inhelder, Sinclair & Bovet, 1974).
In this approach the learner becomes responsible for his or her own inquiring and knowledge, but reconstruction of meaning required a learning environment where there is a chance to decide and select different elements of the learning process. There is not an univocal way of understanding, but a personal construction of meaning and the musical structure. (Webster, 2011; Elliot, 1995).
The possibility of using different sensory approaches (visual, auditory, spatial and kinaesthetic) can help learners also in enhancing motivation. Recent research on multimodal perception emphasized the importance of using multiple ways of learning. The assumption is

that teaching sensory modality is not isolated, but some multimodal inputs bring simultaneous information about the same event or object (Tomlinson 2013; Zimmerman & Amir 2012; Pearce & Rohrmeier 2012.) Students absorb information through all of their senses to understand their environment, and, according to embodied learning theory this process of learning has its roots in the bodily understanding of the music (Leman, 2008; 2010; 2012; Abril, 2011; Davidson, 2005; 2012; Kerchner, 2014). In this constructivist approach it is recognized that bodily action in music activities is not an external demonstration of internalized understand, but it is the effective understanding (Davis, Sumara & Luce-Kapler, 2000).
By using a variety of different sensory procedures, being an active participant during the learning session and becoming responsible of your own reconstructed knowledge, without the fear to make errors, represent the motivational strategies of the constructivistic design to enhance motivation and enjoyment to learn.

2.1. Motivation

Motivation is recognized as a crucial factor in the construction of individual knowledge in constructivist theory. In music learning many sources of motivation are involved; music is an innate and motivating activity by definition, but often efforts, time and patience are necessary to obtain gratification, pleasure and enjoyment (Hallam, 1997).
We can recognize two fundamental types of motivation: extrinsic and intrinsic. Extrinsic motivation is characterized by external elements, while intrinsic motivation comes from the activity itself and from the enjoyment in it. In making music activities it happens that there are both types of motivation, for example in music performance, and the balance between these elements can lead to extremely positive results, such as flow experience in making music (Lehmann, Sloboda & Woody, 2007).
Personal enjoyment and enjoyment-oriented discovery approaches seem to be powerful motivators beyond childhood (Green, 2002; McPherson & Renwick, 2001). Another element we cannot forget about motivation is the self-efficacy. The awareness of one's own possibility to obtain a goal (Bandura, 1982) is considered strictly linked to motivation and also predictive in the effective achievement of a result (McCormick & McPherson, 2003). Intuitively, the role of the teacher and the procedure in teaching music have an enormous importance in this area (Lehmann, Slobodan & Woody, 2007).

2.2. Flow experience

In psychology, intrinsic motivation is closely related with the assumptions of Csikszentmihalyi, that he synthesizes in the Flow experience definition (Linnenbrink-Garcia, Maher & Pintrich, 2011).
As we all know, Flow experience represents the condition in which individuals are total involved in a intrinsically motivating activity.
Flow is individuated as the state of perfect balance perceived between the amount of challenge in activities and individual's capabilities and skills (Csikszentmihalyi, 1975; 1990). It is a conscious state where it is possible to identify the following characteristics (Csikszentmihalyi,1990, Csikszentmihalyi & Nakamura, 2001):

- Clear goals and immediate feedback
- Equilibrium between the level of challenge and personal skill
- Merging of action and awareness
- Focused concentration
- Sense of potential control

- Loss of self-consciousness
- Time distortion
- Autotelic or self-rewarding experience

The theory of flow is directly related to creative activities, and even to learning (Addessi, Ferrari, Carlotti & Pachet, 2006; Addessi, Ferrari & Carugati, 2015; Custodero, 1998, 2002, Cus
todero &Csikszentmihaly, 2002; Shernoff & Csikszentmihaly, 2008;Diaz, 2011).
In the Csiksentmihalyi view, it is clear that flow is realized with the combination of the elements above and with the presence of both extrinsic and intrinsic motivation, but the experience is considered in total autotelic way. The lack of equilibrium between task and skill in individual perception can cause opposite states, as frustration, anxiety, apathy and boredom.
In the educational field, it has been shown how engagement and curiosity are intertwined with enjoyment and well being in flow experience, and this combination pushes to complete a task with constancy and efficacy.
Intuitively, those mechanisms are positive not only from a learning point of view, but also to improve self- efficacy in learners.

3. Background of the research

By exploring some implications of the relationship between music and movement according the Dalcrozian's and Laban's analysis (Piras 2014; Piras, Fortuna & Maffioli 2015; 2016; 2017) interesting results raised by experimenting on the body's response of adults and children, musicians and dancers, in relation to the music composed by Emile Jaques Dalcroze, and its assumptions about the correspondence between music and movement (Jaques-Dalcroze, 1921), and the L.M.A. (Laban Movement Analysis) focused on the motion factors of Time, Weight, Space, Flow (Laban, 1948). After analyzing the video and the data of these researches, we observed that the activities proposed to the subjects were received and realized with enthusiasm, enjoyment and efficacy, particularly by the children. In this extremely positive response to the proposal, we recognized the parameters of flow experience, considering also the behaviour of the subjects in anticipating and in extending the features of the activities (Csikszentmihalyi, 1990).
About the extension of the features of the activities, we noticed with pleasure that a child, out of the procedure, spontaneously proposed a moving performance on Jaques-Dalcroze's music used for the test, making use of pom pom on her own initiative. In this performance the child has shown freedom in movement, ease and fun, so we were questioned about the hypothesis of widening the observation with this type of variable.
In this way, beyond our initial proposals of research, we started to reflect on the following issues:

3.1. Aims

1) Are there significant differences in the activity of music and movement due to the use of an object?
2) Could these differences be referred to the dalcrozian thought about the correspondence between music and movement, and to the analysis of the Laban's motion factors?
3) Can we find significant differences in quality and variety of movement and in perception of musical parameters among children who practice music and children who practice dance?
4) What are the most useful indicators in evaluating a flow experience in music and movement activities?

5) Can we say that in this kind of experience there has been a real intrinsic motivation and improvement from an academic point of view such as hypothesizing a didactic path?

3.2. Method

A sample, composed of 2 children studying music, and 2 children studying dance, 8 years old, has been asked to perform with movement a chosen Jaques-Dalcroze piano piece (*Image Fugitive* n.17), according to a common procedure:

- Only with movement
- Movement with an object (foulard)
- Movement with a little percussion instrument
- Only with movement

The only indication given has been “in order to show the music to a deaf”.
A questionnaire on the thinking behind the performance and the experience has been administered to them.
In order to survey the motivational and flow aspects, a video-based analysis, focused on the specific indicators identified in these topics, was made.
The performances are analyzed with a grid inspired to the motion factors proposed by Laban in " Modern Educational Dance" (1948), and to the musical parameters identified as dalcrozian subjects, starting from the assumptions of Jaques-Dalcroze (1921).
The academic goal is improving the quality of movement, according to the Laban analysis, from the first to the last performance, and to show the different music parameter in performance, such as understanding of the piece.
In order to reflect the role of the teacher in this kind of motivational goals, we thought about the adult participation as a part of the learning environment.
In this way, the learner is the only protagonist of the learning process, and the teacher becomes a facilitator and a support, rather than a perceived guide.
In our procedure, every child had an active teacher for his/her execution.
The starting task has been given deliberately in an open mode instructions, in a symbolic way, to give the possibility to the subjects to interpret according to their own possibilities, skills and knowledge.

3.3. Criteria of Analysis

In order to identify the essence of the intrinsic motivation in the activity, we observed the four behaviours recognized as indicators of intrinsic motivation by the scientific community about this topic (Linnenbrink-Garcia, Maher & Pintrich, 2011):

- choice and preference intensity
- resistance
- quality of engagement

Intuitively, it’s very difficult to quantify a flow experience in a short experience of music and movement. For this reason the parameters of Flow mentioned above were observed directly and through the video recorded. The most significant parameters found were:
- anticipating the material
- expanding the material
- extending the material.

After the activity, a teacher gave a sort a questionnaire in an open questions mode interview, about the effect response and the awareness of the subjects in various aspects of the activity (Custodero, 1998; Shernoff & Csikszentmihaly, 2008).
The children’s movement analysis is based on the grid inspired by L.M. A (Laban Movement Analysis) that considers four main categories: Body, Space, Time and Relationship, as we can see in the synthesis below (Table 1).

Table 1. L.M.A. elements

Body	Using different body parts (e.g. shoulders, head, legs, hips, arms) Making body shapes (e.g. balaced/unbalanced; symmetrical/asymmetrical; curved/angular shape)
Space	Pathways, directions, positive and negative spaces, various group formations
Time	Tempo, rhythm, pause, stillness, acceleration/deceleration
Effort	Energy, force, quality (e.g. punch, thrust, float, collapse, wiggle)
Reationship	Dancers to props/objects and to each other (e.g. in front of, inside, over, around), meet/part, follow/lead

Starting from this base, we used the category of Effort, with the elements that compose it: Weight, Space, Time, Flow. In Laban terms, Effort indicates the inner impulse that gives rise to movement.
Effort is thus the element that allows us to investigate how the movement changes in Space, with what kind of Time, if the development of motion-Flow is in free modality, and the type of energy-Weight used, as in Table 2.

Table 2. Effort

Effort Factor	**Effort element**
Space	Direct or indirect
Weight	Strong or light
Time	Sudden or sustained
Flow	Bound or free

Observing the Effort of a movement means, then, answering the question: How does the body move? In the specific of our observation, the question has been modified in: How does the body move in relation to music?
From a musical point of view, we observed the musical parameters highlighted in the

performances, identified as dalcrozian-subjects, inspiring by the Jaques-Dalcroze assumptions about Palstique-animeé (Table 3).

Table 3. Dalcrozian subjects

Music	**Movement**
Pitch	Position and direction of gesture in space
Tone Colour	Muscular Dynamics
Rhythmic-Meter	Rhythmic
Rhytmic Figures	Rhythmic
Phrasing	Phrasing
Construction	Distribution of movements in space and time

4. Results

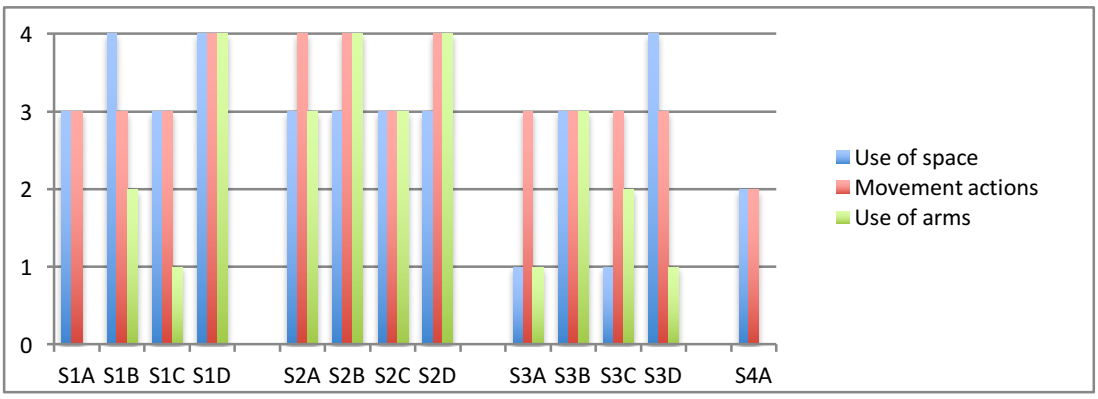
The results about the intrinsic motivation show that all the parameters are satisfied by the subjects. The activity was structured in 4 repetitions of the same piece, listened to once before the performance. This kind of repetition could have caused boredom or fatigue but there was no moment of lack in attention or energy in the whole procedure. The children were totally involved in the activity, without showing any element of distraction or desire to do something else.

The answers of the interview confirm the results of observations: the children were amused and involved in a creative state, in which they reflected about articulated topics that the teacher has not had the need to explain, for example the awareness in using the space in the different performance, and the use and the quality of the parts of the body; not last the attention in perceiving and understanding increasingly the features of the music. The same considerations can be made about Flow observation. As said before, in the criteria exposition, it's significant the enthusiastic behaviour of the children in anticipating the indications of the repetition, and the extension of the activity, for example with other objects and other pieces.

For this reason, they have done other performances out of the protocol, by their own ideas.

From an academic point of view, the results of movement analysis show that:

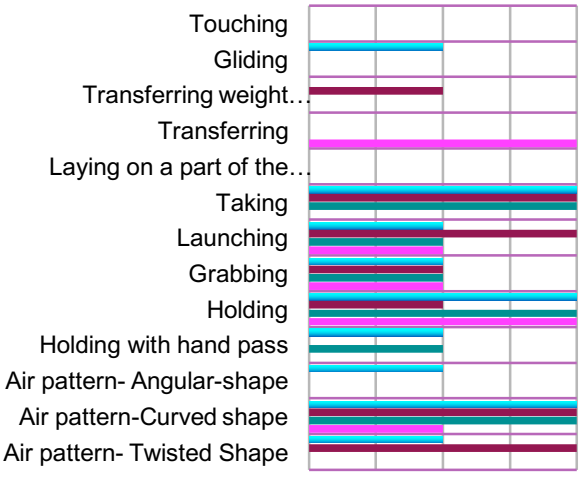
the Effort elements are quite the same in light Weight, free Flow, indirect Space in all performance. The Time factor has not been considered, since it is already implicit with the presence of the music. Instead, significant differences can be identified with regard to the Body category (Movement actions and Use of the body parts), and to the Space category - Personal or Kinesphere and General-, as we can see in Graph 1.



Graph 1. Body category

In Graph 1, the elements mentioned above are focalized in a scale of 4 rates on an increasing scale. The capital letters indicate the performances.
As we can see in, the space used is clearly extended in the second performance (with foulard), and this extension is confirmed in the last performance.
Movement actions are various and creative from the first performance, and these features have increased in the last performance, probably with the advantage of the different plays and exploration of movement in relation to music.
Body movement analysis shows a significant difference in arms movement in the different performances. While the lower part of the body is active in all performances, arms acquire energy and amplitude especially in the performance with the foulard, and the movement of the arms is preserved mostly in the last performance.
From these results, the analysis focuses on the second performance, the one performed with the foulard, which is fundamental for the variety of movement and the mastery of personal and general space.
It has been observed that performance has determined significant results as:

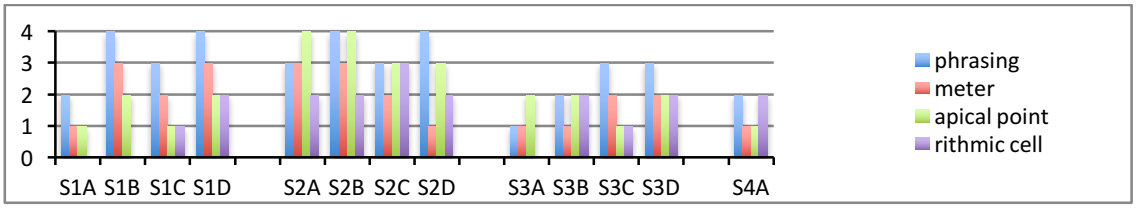
- Variety increase in response to music, especially in the top of the body
- Amplification of the Kinesphere (Personal Space), especially through the use of arms
- Amplification of the general space in which the movement was brought.



Graph 2. Body actions in relationship with the object

Graph 2 shows the body actions inspired by the parameters indicated by Laban in reference to the category of the relationship with an object (1980).

The values assigned to each action are on increasing scale 0-2.
From these results we can suppose that the use of the foulard, in its relational aspects, has allowed the visualization of the music, considering the amplification and the increasing variety of motion.
It can be noted how the actions highlighted are likely to affect both the Personal and the General Space.



Graph 3. Music parameters

The music parameter mostly stressed by all the subjects is phrasing. We can note that all the music parameters are shown more and more clearly in the last performance, with significant differences between the first and the second performance, as we can see in Graph 3.

3. Conclusions

The answer to the starting questions is: there are significant differences using an object. It emerges that a tool could change a movement performance likewise in body activity and in musical realization. There are many differences between the first and the second performance, and the results stress particularly the importance of the movement of arms, that is extended and improved with the object. Thus, the use of the object can be interpreted as an extension of the physical figure in space, and we can find this mechanism in recent artists' thought, for example but not limited to that of Alwin Nikolais (American choreographer and composer, 1910-1933). This consideration follows also the theories of peripersonal space and the Ruffini's organ (Moore, Yamamoto, 2011). While in Laban's thought the Relationship with the object has been consistently considered, in the perspective of the Jaques-Dalcroze method this concept appears practiced, but not systematized.
In fact, in dalcrozian activities it is customary to use objects and devices, especially foulards, particularly as support to movement, to promote bodily awareness and the structuring of space (Di Segni, 2008). The results don't show significant differences between dancers and musicians; the actions have been carried out in a personal way by the subjects, each of them has revealed a style of individual movement, hence an exclusive and original relationship with the object. The results encourage us to think about this kind of activity as didactic activities, because the use of objects facilitates the body's response to the music and improves perceptive and learning processes, in an amusing and expressive way. The results show that we can recognize an intrinsic motion in the present activity, and we can also recognize a flow experience for the subjects.
The elements we identify as fundamental for this findings are:

the role of the teacher as a facilitator, the instructions in open and symbolic mode, last but not least, the holistic way in understanding music by means of the body, and using various elements for the variation of the repetitions.
According to the constructivism principles, these findings are realized in an active learning process, they are combined with the learning goals of didactic achievement through experience in an active interaction with the world, in new acquisitions constructed by the learners construct utilizing elements of knowledge that they already have.

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