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## **The influence of teachers' conceptions on their students' learning: children's understanding of sheet music**

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**Background** Despite increasing interest in teachers' and students' conceptions of learning and teaching, and how they influence their practice, there are few studies testing the influence of teachers' conceptions on their students' learning.

**Aims:** This study tests how teaching conception (with a distinction between *direct* and *constructive*), influences students' representations regarding sheet music.

**Sample:** Sixty students (8-12 years old) from music conservatories, 30 of them took lessons with teachers with a *Constructive Teaching Conception* and another 30 with teachers shown to have a *Direct Teaching Conception*.

**Methods:** Children were given a musical comprehension task in which they were asked to select and rank the contents they needed to learn. These contents had different levels of processing and complexity: symbolic, analytical and referential. Three factorial ANOVAs, two one-way ANOVAs, and four 2x3 repeated-measures ANOVAs were used in order to analyze the effects of and the interaction between the independent variables *teaching conception* and *class*, both for/on total cards selected, their ranking, and each sub-category (the 3 *processing levels*).

**Results:** ANOVAs on the selection and ranking of these contents showed that teachers' conceptions seem to mediate significantly in the way the students understand the music.

**Conclusions:** Students from constructive teachers have more complex and deep understanding of music. They select more elements for learning scores than those from

traditional teachers. Teaching conception also influences the way in which children rank those elements. No difference exists between the way 8- and 12-year-olds learn scores. Children's understanding of the scores is more complex than assumed in other studies.

**Keywords:** conceptions of teaching and learning; constructivism; music education; representational external systems; sheet music

## Background

*Do teachers' conceptions of teaching and learning music really influence their students' learning?*

Educational research over the past few decades has convincingly shown that if we want students to achieve better learning, then teaching practices need to adopt more complex formats in which teaching is not reduced to the transmission of established knowledge in a more or less elaborate way. However, the picture provided by different studies of teachers' educational practices still shows fairly general prevalence of more traditional teaching practices based essentially on the teacher transmitting knowledge to the pupils. For instance, an examination of teaching practices in 23 countries in the TALIS (Teaching and Learning International Survey) study (OECD, 2009, P. 88) noted that "*in the classroom, teachers in all countries put greater emphasis on ensuring that learning is well structured than on student-oriented activities which give them more autonomy. Both of these teaching practices are emphasized more than enhanced learning activities such as project work. This pattern is true in every country*".

Why is it so difficult to change these teaching and learning practices? One of the approaches being developed to answer this question is the study of the conceptions held by

both teachers and students regarding teaching and learning. The increasing interest in the conceptions of educational agents is partly due to its relationship with teaching and learning practices. It has been proved that teachers' epistemological beliefs influence their practices (Hofer & Pintrich, 1997; Lidar, Lundqvist, & Östman, 2005; Olafson & Schraw, 2006; Turnbull et al., 2006; Rubie-Davis, Flint & McDonald, 2012) and, focusing more specifically on the aim of this study, that the conceptions of teaching and learning held by teachers also affect their teaching practices (e.g., Hermans, Tondeur, van Braak, & Valcke, 2008), the way in which their own students conceive and approach learning (Tikva, 2010; López-Íñiguez & Pozo, *submitted*), and in the case of teachers' individual efficacy beliefs, even the number of children excluded from school as a sanction (Gibbs & Powell, 2012).

However, some of these studies also show that there is some distance between teachers' conceptions of teaching and learning as reflected by their more or less explicit responses to questionnaires or interviews, and their actual teaching practice in the classroom. This casts doubt on the idea that these stated or recognized conceptions have a decisive influence on their practice, and ultimately and more importantly, on students' actual learning. The abovementioned TALIS study clearly reflects this distance between what teachers say and what they do (OECD, 2009), and this has also been shown in other studies (e.g., Levitt, 2001; Olafson & Schraw, 2006; Torrado & Pozo, 2008; White, 2000, Wilcox-Herzog, 2002).

It is therefore important to ask whether the way in which teachers represent teaching and learning actually mediates in their teaching practices and ultimately produces differences in the way their own students learn. In this study, we make use of a privileged setting for testing these relationships, namely, learning to play a musical instrument at conservatories where stable, long-lasting dyadic teacher-learner relationships are established, which will allow us to analyze the influence of teachers' conceptions on the level of their students' musical learning and understanding of the scores.

*Teachers' conceptions of learning and teaching*

Studies of how teachers and students at different educational levels and in different subjects represent learning and teaching tend to identify two extremes (e.g., Hermans et al., 2008; Tikva, 2010; Tsai, 2002; Yang & Tsai, 2010), one focusing on the transmission of established knowledge, usually called traditional or transmissive, and the other focusing on the students' knowledge and capabilities in order to modify them by fostering cooperation through more dialogical learning spaces and promoting student metacognition and self-regulation, usually known as constructivist, as it resembles the currently predominant constructivist approach to learning and instruction (e.g., Bransford, Brown, & Cooking, 2000; Sawyer, 2006; Winne & Nesbitt, 2010).

Other authors identify a third position in between the transmissive and innovative positions, in which the teacher is in charge of transmitting knowledge, as in the more traditional position, but takes into account the learning processes of the student, who is an active, though reproductive learner (Castejón & Martínez, 2001; Martín, Pozo, Mateos, Martín, & Pérez-Echeverría, 2012; Scheuer, de la Cruz, Pozo, Huarte, & Sola, 2006a; Strauss & Shilony, 1994).

This paper deals with learning and teaching music, a setting in which a similar continuum has been identified, resulting in three basic positions: *direct*, *interpretative and constructive* (Bautista & Pérez-Echeverría, 2008; López-Íñiguez, Pozo & de Dios, *in press*; López-Íñiguez & Pozo, *submitted*; Marín, Pérez-Echeverría, & Hallam, 2012). The characteristics of these three teaching profiles or conceptions in the musical setting are described in Table 1, below:

<b>DIRECT</b>	This conception, which is simpler, closer to naive behaviorism, and similar to
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<b>CONCEPTION</b>	Wellman's (1990) <i>direct copy theory</i> , believes that there is a direct causal relationship between teaching conditions and desired results, so opts to teach the final product that is sought directly (in line with naïve behaviorism), in our case, the music score. The teacher's role is to expose the student to the external learning contents as clearly as possible, though without explicit instruction, so that, with adequate practice, he/she will incorporate or accumulate them and learn, in terms of Pramling (1996) "traditionally". Teaching is a one-way monolog seeking the execution <i>ad pedem litterae</i> of the songs, works, studies and/or exercises, which are conceived from the standpoint of radical epistemological realism.
<b>INTERPRETATIVE CONCEPTION</b>	This conception takes into account the existence of complex, dynamic mental processes in the learner (e.g. deliberate observation, memory or evaluation), which mediate learning, although it considers that control of learning should be in the hands of the teacher. It is a more complex version of the direct conception. The teacher's role is thus to regulate externally the mental and motor processes involved in the student playing an instrument, with the aim of the student reproducing the score faithfully, and still interpreted from a certain epistemological realism. On the other hand, the student plays an active, though reproductive, part, accepting his/her condition as agent of his/her own learning (Scheuer et al., 2006a). The aim of teaching is for the student to gain technical and conceptual dominion of the music played as a means to reproduce the work in the most academically correct way.
<b>CONSTRUCTIVE CONCEPTION</b>	This conception faithfully represents Olson and Bruner's (1996) "meeting of minds" in which the student, in contrast to the two previous conceptions and following Pramling (1996), would learn "experientially". Thus, teaching according to this conception requires activating, stimulating and developing the student's mental processes through reflection. The aim is for the student to learn to regulate and manage his/her own cognitive and motor processes and build a personal representation of the music he/she plays. The student's role is thus active and constructive (based on epistemological constructivism), such that the teacher's role is to guide and supervise the startup of the student's reflective, metacognitive, emotional and affective processes, as the main way to foster his/her understanding and autonomy. Teaching centers on the interactive relationship between student, teacher and learning material or instrument.

Table 1. Main features of the direct, interpretative and direct conceptions of teaching-learning a musical instrument

Previous studies have found that this classification of conceptions allows the characterization of different ways in which not only teachers, but also students, at different educational levels and in different subjects, conceive learning and teaching (Bautista, Pérez-

Echeverría, Pozo, & Brizuela, 2012; López-Íñiguez & Pozo, *submitted*; Martín et al., 2012; Scheuer et al., 2006a, Scheuer, De la Cruz, Pozo, & Neira, 2006b). In addition, teachers' conceptions of learning and teaching have been found to influence those held by their students. Thus, for example in the context of instrumental music education when children from 8 to 12 years old begin their musical studies, the students of traditional string teachers tend to represent learning as direct and simple, while students of constructive string teachers assume that learning requires cognitive management by the learner (López-Íñiguez & Pozo, *submitted*).

But beyond being shared by their pupils, do these different conceptions held by teachers predict students' levels of learning and understanding? In music, at least in formal teaching contexts, an essential part of any learning is reading and understanding scores, which are analogous in function to written texts in most school learning. Thus, analyzing how students understand and use scores in their learning may provide a good setting in which to test whether their teachers' conceptions influence their musical learning.

#### *Levels of learning and understanding of music scores*

As in other settings where *cultural artifacts* such as writing or numerical notation have developed and enabled people to communicate and evolve (Andersen, Scheuer, Pérez-Echeverría, & Teubal, 2009; Martí, 2003; Martí & Pozo, 2000), music also requires systems for the external or symbolic representation of the artists' implicit communicative and expressive needs. *Musical notation* fulfills the difficult role of representing each composer's complex –and largely subjective– world of sound, enabling the performer to transfer the visual codes appearing on the scores to his/her practice and ultimately convey the composer's original idea to the audience as faithfully as possible –according to his/her own personal

vision. It therefore seems that sheet music should be a protagonist in research on teaching and learning music, since, at least in the western world, nearly all musical production depends upon it.

Considering that without these *external systems of representation* it would be impossible to manage certain cognitive activities needed to facilitate or mediate acquisition of learning (Andersen et al., 2009; Martí & Pozo, 2000), whether in students beginning to learn at conservatories or schools of music or in active professionals, we could say that scores are not only *objects of record*, made up of relatively long-lasting symbolic marks that have evolved over the centuries, but also *objects of knowledge*, i.e., tools for reflection on the music represented, because underlying these marks are complex meanings regarding that music. Nevertheless, we should say that our aim in this work is to use the external representations of music scores as a means to access internal representation or conceptions held by children when they interpret these scores, considering them as objective elements, despite the fact that there are different positions in this regard (please see the works of thinkers such as Fubini (1994) or Hanslick (1854) about the objective and subjective positions towards music as an aesthetic element, Fubini (1994) and Hanslick (1854) about this respect, where we can find basically two visions: the pure formalists who think that music express nothing else than sounds; and the absolutists, who think that music has meaningful content and expresses emotions beyond the sounds). We are on the side of those for whom music has a meaning; in addition, we believe that to reach that meaning, the scores need to be processed in complex ways at different levels of interpretation.

How do educational agents manage activities for learning those different levels? How are music scores taught and learned from different teaching conceptions? Research on graphic symbolisms as external systems of representation distinguishes three different hierarchical levels for processing or interpreting them (Friel, Curcio, & Bright, 2001; Pérez-

Echeverría, & Scheuer, 2009; Postigo & Pozo, 1998, 2004): the first focuses on processing explicit visual information, the second processes implicit information arising from the interpretation or analysis of two or more explicit elements, and the third establishes conceptual relationships based on the global analysis of the structure of the graphic symbolism in question.

The notation which is the object of this research –sheet music– is also made up of elements that correspond to different levels of processing with increasing cognitive complexity and hierarchical character (Casas & Pozo, 2008). Thus, Reid (2001) distinguished five main levels when learning to play a music score: the basic physical matters of the instrument, musical elements, stylistic interpretation, communication with the audience and personal expression. Along the same line of what can be seen in a score and what is hidden behind it, Hultberg (2002) defined two approaches to studying scores: reproductive (focusing on explicit information: notes, agogics, fingering...) and explorative (focusing on the implicit: communication, expression, musical rhetoric...).

Chaffin, Imreh, Lemieux and Chen (2003) propose another model for learning scores at different levels (also related to previously proposed models), in which reference is made to the dimensions that should be considered upon learning a score, namely: basic (requiring reproduction of notes and superficial elements of the score), interpretative (shaping the musical character of the piece) and expressive (requiring constant attention upon playing), very much in line with the previous description. These authors claimed that expert pianists focus mainly on the more complex dimension (expressive) and have a global or holistic view, or big picture of the work, whereas novice learners focus on the basic and interpretative dimensions related to the technical demands that are usually worked on in more traditional instrument lessons, and which leave aside the expressive or artistic features in the scores.



Lane (2006) found that professional musicians approach musical notation according to three stages or phases, also related to the explicit and implicit aspects of music, which she called “macro-micro-macro”. She claims that same implicit aspects of scores may play an essential role in the way those professionals first approach a score, to achieve an overall idea (similar to the *big picture* suggested by Chaffin et al., 2003) with which to begin to work on the symbolic and analytical material contained in the scores, later focusing again on referential aspects.

Based on these different classifications of the cognitive complexity of sheet music and considering previous studies on processing graphic symbolism, three increasingly complex hierarchic levels of processing music scores among teachers have been proposed (Bautista, Pérez-Echeverría, & Pozo, 2010; Marín et al., 2012): 1) *symbolic* or *notational*, related to explicit and visual material on the score (notes, rhythms, dynamics); 2) *analytical*, regarding the relations among two or more elements in the first level (harmony, structure); and 3) *conceptual* or *referential*, related to the implicit part of scores with regard to the previous levels (expression, style, communication). Thus, Bautista, Pérez-Echeverría and Pozo (2010) have found that there is a relationship between teachers’ conceptions of teaching and learning and the way they process musical scores, according to the above classification, such that simpler conceptions correspond to simpler processing levels while constructive conceptions would promote more complex ways of understanding scores. Marín, Pérez-Echeverría and Hallam (2012) found similar relationships in intermediate and advanced students, with skill having an influence on how the students approach learning a score. However, we know little about how young children understand learning scores, whether their understanding depends on their age and level of instruction as suggested by previous studies on teachers and students, as well as on expert musicians (Chaffin et al., 2003), or whether it also depends on their teachers’ conceptions of teaching and learning with regard to how scores are used,

which according to our theoretical framework would mediate in the way their students use scores.

More specifically, and focusing on the two extreme positions which are the object of study in this paper, the simpler or more direct positions found by those authors are usually associated to symbolic processing of the score, focusing on a conception mainly involving reproduction of the scores (radical epistemological realism) and centered on “transmitting” its explicit contents. They are usually found in teachers with more years of experience (Bautista et al., 2010; López-Íñiguez, et al., *in press*) who tend to show more traditional or direct conceptions of teaching and learning, and students at lower level (López-Íñiguez & Pozo, *submitted*) Conversely, teachers and students with more innovative or constructive profiles are found to focus mainly on referential aspects of music, without ignoring the relevance of lower levels, and showing an epistemic conception of the use of scores which leads them to prioritize teaching their conceptual content and artistic capacities. These are usually found in more advanced students and less experienced teachers.

## **Aims**

Our main aim is to analyze the possible relationships between the instruction received by students exposed to different teaching conceptions (direct and constructive) and the way they process music scores according to the three levels of complexity in processing that we have described above: *symbolic*, *analytical* and *referential*, in the understanding that those three levels are hierarchical and may therefore have different importance in the students’ understanding according to the teaching conception they have been educated in. In greater detail, our specific aims are the following:

- To analyze whether the teaching conception that the student was exposed to had an influence on the way he/she processes the music score. According to the theoretical framework analyzed, we expect that students exposed to constructive teaching would not only consider a greater number of factors upon analyzing the score, but above all would take into account more complex aspects of the score (analytical and referential processing) than students who received more traditional teaching.
- To analyze whether the level of instruction at which the students were had an influence on the way they processed the music score. According to previous studies, students at higher levels could be expected to process the score in a more sophisticated way regarding both the number of elements and their complexity.

## Method

### *Participants*

Based on a previous study of teaching conceptions with teachers of string instruments at conservatories (López-Íñiguez, et al., *in press*), in which teaching conceptions or profiles were assigned to music teachers, according to their answers to a questionnaire related to teaching and learning string instruments, and analyzed by means of cluster analysis, we selected 60 students (with prior authorization from parents and teachers) studying violin, viola, cello and double bass ( $M=9$  years, 10 months;  $SD=1$  year, 8 months; Gender=18 male, 42 female), so that there were 30 who took lessons with six teachers shown in that study to have a constructive *Teaching Conception* and another 30 with teachers shown to have a direct or traditional *Teaching Conception*. Of the 30 students selected for each Teaching Conception (who took part voluntarily and did not receive compensation), 15 were in Elementary Music Class 1 (8 to 9 years old) and 15 were in Elementary Class 4 (11 to 12

years old), so that their *instruction level* was a second independent variable, as shown in Table 2:

<b>INSTRUCTION LEVEL</b>	<b>TEACHING CONCEPTION</b>	<b>TOTAL</b>
Class 1	Traditional	15
	Constructive	15
Class 4	Traditional	15
	Constructive	15

Table 2. Number of participants according to instruction level and teaching conception

### *Tasks and Procedure*

Students were given the task of analyzing a music score appropriate to their level, for not more than 10 minutes. The score (Figure 1) was an adaptation of “Los gatitos” [“The kittens”], a popular children’s tune, to which a piano accompaniment was added (see the example transcribed for cello in Appendix A. This score was also transcribed for violin, viola and double bass). It was given a different title (“Gotas de lluvia en un día soleado” [“Raindrops in a sunny day”]), fictitious composer and composition date, as well as fingering, bows and dynamics, so that it would include musical aspects from the three score processing levels described above.

After reading the score, the children were given nine laminated size Din-A5 cards in random order which included learning contents from the three Processing Levels (see Table 3) contained in the score, and asked to place in a green box the cards they considered “really important for learning this score”, and in a red box the cards they considered “less important for learning this score”. It was explained that there was no fixed minimum, maximum or correct number of cards. After making their selection, which was not time-limited, the

participants were asked to rank the selected cards in order of importance and to explain that ranking and their rejections. Once again, there was no time limit.

<b>SYMBOLIC LEVEL (SL)</b>	SL.1: Learn to play the notes in the score.
	SL.2: Play the rhythms that appear in the piece.
	SL.3: Pay attention to the bows in the score.
<b>ANALYTICAL LEVEL (AL)</b>	AL.1: Know when you are playing the melody or the accompaniment.
	AL.2: Show clearly where phrases begin and end.
	AL.3: Know how many parts this piece has.
<b>REFERENTIAL LEVEL (RL)</b>	RL.1: Play the piece the way you think the composer intended it to be played.
	RL.2: Choose the sound that best suits the style of the piece.
	RL.3: Convey your feelings to the audience when you play this piece.

*Table 3.* Cards used for the task during the interview

Figure 1. Example of the melody in the piece showing contents included in the 9 cards (see the full work and accompaniment, as it was shown to the children, in the Appendix)

### Design

This is a simple, prospective *ex post facto* study. The dependent variables *number of cards selected* and *card ranking* (assigning a score of 1 to 9 to each selected card according to its rank, with 1 representing the least important component and 9 the most important -0 was assigned to cards that were not selected-) were contrasted to the independent between-subject variables *class* (with two levels: Elementary Classes 1 and 4) and *teaching conception* (with two levels: Direct and Constructive) and to the independent within-subject variable *processing levels* (with three levels: symbolic, analytical and referential).

### *Analysis*

For the first analysis, we took as a dependent variable the *total number of cards* selected by each child (0 to 9), performing a 2x2x9 univariate factorial ANOVA in order to analyze the interaction between the independent variables *teaching conception* and *class*, for *total cards selected*. In order to test not only the number of factors considered, but also the way students processed the score, we also analyzed the number of cards selected for each *processing level*, where the children could choose 0 to 3 cards for each level, performing another 2x2x3 repeated-measures factorial ANOVA to analyze the interaction between the same independent variables for each sub-category (the 3 *processing levels*). We continued with two one-way ANOVAs with the independent variables *class* and *teaching conception* separately, and then we performed two 2x3 repeated-measures ANOVAs with the same independent variables (*teaching conception* and *class*), considering the *processing levels* as an independent within-subject variable.

In order to analyze which factors these children consider most important for learning the score, we considered how they *ranked* the cards they selected, by assigning a score of 1 to 9 to each selected card according to its rank, with 1 representing the least important component and 9 the most important (0 was assigned to cards that were not selected). Again, we analyzed the interaction between *class* and *teaching conception* with respect to *card ranking* as a dependent variable, performing a 2x2x9 repeated-measures factorial ANOVA. Lastly, two 2x3 repeated-measures ANOVAs were performed again with *class* and *teaching conception* as independent variables, once again taking the variable *processing level* as independent within-subject variable.

## Results

*How many learning contents do children believe must be learned in a music score?*

The first analysis we used to test the effect of the variables studied on the interpretation of music scores was based on the total number of cards selected by each child according to *teaching conception* and *class*. Table 4 summarizes the main data for the total cards selected. The lowest numbers of cards selected were 1 in the direct group and 5 in the constructive group, and the highest were 8 in the direct group and 9 in the constructive group:

	<b>Direct Group Class 1</b>	<b>Direct Group Class 4</b>	<b>Constructive Group Class 1</b>	<b>Constructive Group Class 4</b>
<b>Number of cards</b>	68	88	116	128
<b>Mean</b>	4.53	5.2	7.73	7.53
<b>Standard deviation</b>	1.3	1.27	.96	1.35

Table 4. Number of cards selected, mean and standard deviation for each group

Interaction between the variables *Class* and *Teaching Conception* of the factorial ANOVA did not produce significant effects on the total number of cards selected ( $p = .178$ ). According to the results of the one-way ANOVA, the total number of cards selected by each child did not depend on the independent variable *class* ( $p = .466$ ). There was, however a significant effect of *teaching conception* (TC) on card selection, with children exposed to the *constructive conception* selecting more cards than children exposed to the *direct conception*  $F(1, 56) = 75.882, p < .001, \eta^2 = .575$  (TC Traditional  $M = 4.87, SD = 1.3$ ; TC Constructive  $M = 7.63, SD = 1.16$ ).

The analysis of the data in Table 4 thus shows that the number of components that children considered relevant to learning from a music score varies according to the *teaching conception* to which they are exposed, but does not depend on what *class* they are in, and



there is no interaction between *teaching conception* and *class*. Students of *constructive* teachers process the score in a more complex or complete way than do students of *direct* teachers, because they tend to consider a larger number of components or elements in order to learn it. But what exactly are these differences? What additional aspects do students of *constructive* teachers process compared to students of the more *direct* or traditional teachers?

As in the analysis of total card selection, *class* and *teaching conception* were not found to interact significantly with *processing levels* ( $p = .497$ ) in the factorial ANOVA. To find out, we analyzed the effects of these variables (*teaching conception* and *class*) on the *processing level* required for each of the nine cards, which we grouped, as described above, into three levels of increasing complexity (symbolic, analytical and referential). Taking into account the total number of cards selected per *level*, two repeated-measures ANOVAs were performed, one per *class* and another per *teaching conception*, in which we found again that there were no effects of the variable *class* ( $p = .424$ ) on the 3 *processing levels*, whereas there were significant effects of *teaching conception* (TC) on the 3 *processing levels*  $F(2, 112) = 10.536$ ,  $p < .001$ ,  $\eta^2 = .158$ . Table 5 shows the means and standard deviations for each *level* according to *teaching conception*:

	Symbolic level	Analytical level	Referential level
<b>Direct conception</b>	$M = 2.56$ $SD = .727$	$M = 1.23$ $SD = .858$	$M = 1.06$ $SD = .907$
<b>Constructive conception</b>	$M = 2.73$ $SD = .521$	$M = 2.43$ $SD = .773$	$M = 2.46$ $SD = .731$

Table 5. Means and standard deviations at each *processing level* according to *teaching conception*

Taking into account the effects of *teaching conception* on *processing level* shown in Figure 2, the analysis of simple effects showed that there were significant differences in the

number of cards selected at each *level* according to *teaching conception*, with students of *constructive* teachers selecting more cards at all levels than students of *direct* teachers (symbolic level  $p = .018$ ; analytical level  $p < .001$ ; referential level  $p < .001$ ).

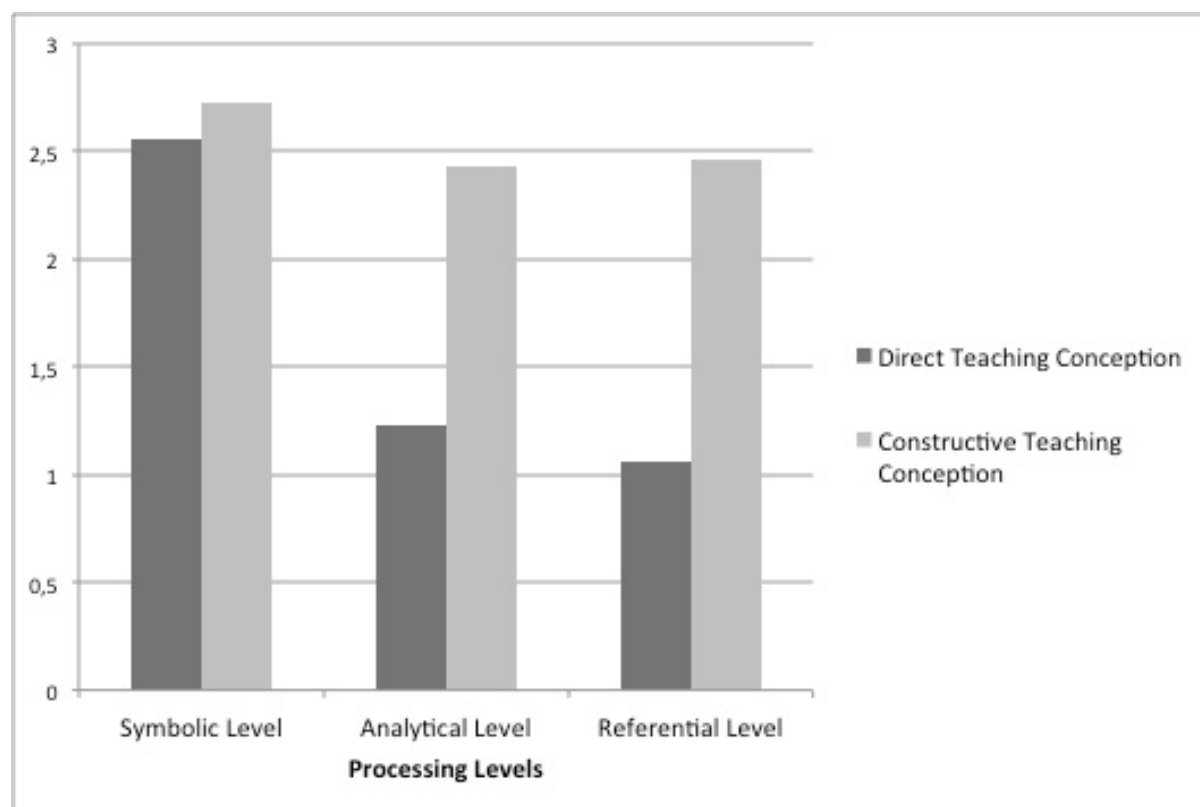


Figure 2. ANOVA for total cards selected at each *processing level* according to *teaching conception*

Considering the simple effects on the number of cards in each *processing level* within each *teaching conception*, in the *direct* group the *symbolic level* differs from the *analytical level* ( $p < .001$ ) and the *referential level* ( $p < .001$ ) because students select more cards of the less complex level, while there is no difference between the *analytical* and *referential levels* ( $p = 1.00$ ), because they select very few cards of these levels. In the *constructive* group, the *symbolic level* does not differ significantly from the *analytical* ( $p = .213$ ) or the *referential level* ( $p = .522$ ), nor does the *analytical level* differ significantly from the *referential level* ( $p = 1.00$ ), because the children chose a similar number of cards from all three *levels*. As happened when we considered total number of cards selected, when *processing levels* were separated, *teaching conception* was once again the critical variable for the way in which students understand how they should learn and study the music scores, with children in the

*direct* group selecting cards mainly from the *symbolic level* and children in *constructive* selecting equal numbers of cards from all three levels.

Because these results show that students of *constructive* teachers select the *analytical* and *referential levels* more often than other children do, we were interested in finding out the importance or priority they assign to the symbolic, analytical and referential components reflected in the cards.

*How do children rank the contents to be learned in musical scores?*

Again, interaction between *class* and *teaching conception* did not have a significant effect on the total number of cards selected ( $p = .360$ ) in the factorial ANOVA. Two repeated-measures ANOVAs were performed considering how children ranked the cards they selected. Again, there were not significant effects of the variable *class* on the *card ranking* ( $p = .065$ ), whereas there were significant effects of *teaching conception* on the importance that the students attributed to each element in the task ( $F(2, 112) = 8.644, p < .001, \eta^2 = .134$ ). Table 6 shows the means and standard deviations of the *card ranking* for each level according to *teaching conception*:

	Symbolic level	Analytical level	Referential level
<b>Direct conception</b>	$M = 19.7$ $SD = 5.82$	$M = 7.73$ $SD = 5.11$	$M = 6.07$ $SD = 5.17$
<b>Constructive conception</b>	$M = 17.83$ $SD = 5.23$	$M = 11.67$ $SD = 4.51$	$M = 13.23$ $SD = 5.27$

Table 6. Means and standard deviations for *card ranking* according to *teaching conception*

We have seen that *teaching conception* affected the importance that students assigned to the processing levels. As shown in Figure 3, the analysis of simple effects shows more precisely that those significant differences in *card ranking* according to *teaching conception* occurred at the *analytical* ( $p = .003$ ) and *referential levels* ( $p < .001$ ), with students of *constructive* teachers assigning greater importance to those components than students of *direct* teachers. However, there was no difference according to *teaching conception* in the *symbolic level* ( $p = .197$ ), to which all students assigned equal importance.

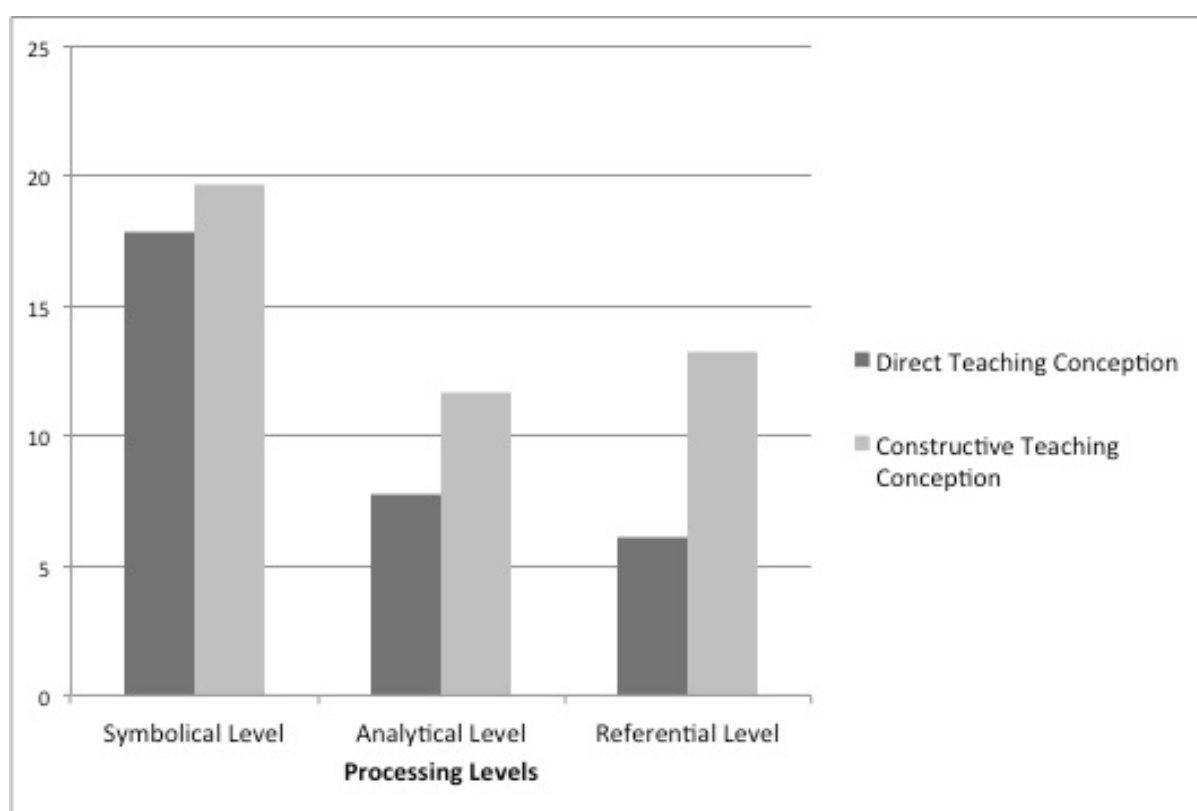


Figure 3. ANOVA for card ranking according to teaching conception

When simple effects on *ranking* were considered by comparing those *processing levels* within each group, analysis showed that in the *direct* group there were differences between the *symbolic level*, which the students considered the most important, and the *analytical* ( $p < .001$ ) and *referential levels* ( $p < .001$ ), although the latter two did not differ ( $p = .796$ ), once again indicating that these students focused their processing preferentially on this

symbolic level. In contrast, in the *constructive* group, significant differences were only found between the *symbolic level* and the *analytical level* ( $p < .001$ ), and here too, the *symbolic level* was considered to be the most important, whereas the *referential level* did not differ from the *symbolic* ( $p = .052$ ) and *analytical levels* ( $p = .943$ ).

The analyses thus indicate not only that students from different teaching conceptions differ in the number of cards they select, showing the complexity of the way they process music scores, but also that they rank the selected cards differently, so that even though all students tend to consider the *symbolic level* to be the most important, *constructive* students assign greater weight in the ranking to the other two higher levels, more concretely to the *referential level*, than do the students of *direct* teachers. This may indicate that to students from *constructive teaching conceptions*, expressing emotions, communicating with the audience and the composer's aesthetic idea are directly related to the symbolic material (notes, rhythms...) in the scores, independently of their structure, parts or instrumentation, which would represent rather the connection between the symbolic and the abstract or metaphorical. In contrast, to *direct* students, the symbolic material is the only kind that is significant and important when learning to play a piece of music.

## Conclusions

### *Relationships between teaching conceptions and understanding of music scores*

The results of this research are helpful in providing insight into how children understand learning music scores, by considering how they process them, which is influenced by the teaching conceptions to which they are exposed, though not by the number of years' practice or their instruction level.

Our analysis shows that the distinction among three hierarchic levels of processing music scores (*symbolic, analytical and referential*) accounts for differences among various ways of understanding the scores, which implies progressive integration of the symbolic elements or units in the system of representation (symbolic level) into structures of broader meaning, both within the score itself (analytical level) and with regard to the score and other musical contexts and knowledge (referential level). Thus, we can distinguish, as previous studies have done, between the simpler approaches to the score (focusing essentially on the symbolic level) and the more complex or sophisticated (which, without leaving aside the importance of the symbolic level, integrate it into those structures of meaning, which are essentially referential, although also analytical). Those previous studies identified those more complex ways in which musicians (Chaffin et al., 2003), some music teachers (Bautista & Pérez-Echeverría, 2008; Bautista et al., 2010) or advanced students of music (Marín et al., 2012) read music scores, however, we have identified them, through the analysis of a simple score based on a children's song, in 8- to 12-year-old children who are beginning to study music and can show that they have relatively in-depth understanding of a simple score.

However, not all children demonstrate equally complex understanding of the score. Regarding our first aim, the ANOVAs on both card selection and card ranking showed that teaching conception influences both the number of elements the children consider important for learning a piece of music and the way in which they rank those elements. Thus, children exposed to direct or traditional teaching conceptions selected fewer contents to be learned from the scores than did the students trained in constructive conceptions. As mentioned in the Introduction, this would mean that simpler conceptions are related to more basic and explicit processing levels, confirming the findings of some of the papers mentioned above (Bautista et al., 2010; Casas & Pozo, 2008; Marín et al., 2012).

Similarly, most of the contents selected by students of direct teachers correspond to the symbolic processing level in the scores, and to a lesser extent than students of constructive teachers to contents from the higher analytical and referential levels. Moreover, the ANOVAs showed that when these learning contents were ranked, the children receiving constructive instruction considered that the most important part of learning a score not only involved elements from the symbolic level, but also from the most complex, referential levels, whereas children from the direct teaching conception gave priority to the symbolic level, ranking as least important the few analytical and referential elements some of them had chosen. In the terms of Chaffin et al. (2003), constructive students are closer to a global view or “big picture” of the work, which is much more complex than that developed by students from less innovative teaching conceptions, who, in contrast, would have been exposed to traditional teaching situations, or in our own terms, more direct, less challenging, similarly to the findings in a very different context of Wilcox-Herzog (2002) for teaching science in the classroom.

Regarding our second aim, none of the ANOVAs, either for card selection or card ranking, showed the variable class or level of instruction to influence the way these children understood the scores, in contrast to other studies, which found differences in learning the scores according to level of education, although all of them studied older students and different musical tasks from those in our study (Bautista et al., 2009; Hallam, 2001; Hallam et al., 2012; Marín et al., 2012).

However, the data from our study indicate that not only can younger children have more complex representations of the scores than assumed in previous studies, but also that they can do so right from the beginning of their musical instruction, since there is no difference between the way 8- and 12-year-olds learn scores. This confirms data from another

parallel study (López-Íñiguez & Pozo, *submitted*) on children's conceptions of teaching and learning instrumental music, which also showed that the teacher's profile is the most important and determining factor in the conceptions held by students, not only 11 to 12 years old, but as early as 8 years of age, even after only a few months in contact with the teachers, whether direct or constructive.

We believe these are important data because they support positions such as Pramling's (1996), according to which children can be trained metacognitively from very early ages if the instruction contexts are appropriate to their goals and capacities. Given that we used the same simple score to work with the two age groups (8 and 12 years), it would be interesting to compare in further studies the representation of more complex scores in both age groups, since an effect of education level similar to that found in other studies could be expected, reflecting not only an improvement in score processing levels but also in the knowledge of music that enables reading and representing scores at higher levels of complexity.

In addition to its theoretical importance, the fact that children demonstrate complex score processing as from the very first levels of musical instruction also has important implications for teaching music at those levels. It is not unusual for teachers to refer to the idea that "until students have a good grasp on the more elementary levels (symbolic and also analytical), they are not ready to tackle the work at a referential or properly expressive level". Our data show that from the very beginning, children can focus not only on processing the more elementary components of a musical work but also its internal structure and organization and its relationship to other musical contexts and knowledge. Indeed, both Hallam (2001) and Bautista et al. (2009) claim that very few teachers take into account dynamics and expression at classes of lower levels. Hallam et al. (2012) report that harmonic and formal analyses are usually added in intermediate and advanced classes. Nevertheless,



although we agree that much traditional teaching follows those patterns during lessons, our data suggest that teachers who have constructive orientation make children focus on these implicit aspects in the score, and really work on them from the very beginning, in line with the abovementioned holistic or global view (Chaffin et al., 2003).

Despite the relevance of the results obtained about the relationships between teaching conceptions and students' musical learning levels, further studies are needed to research certain aspects not included in this paper, and which are essential for better understanding of the relationship. Since the influence of teachers' conceptions on their students' learning may be considered to be mediated by teaching practices, rather than being direct, further analysis is needed, possibly through a case analysis of good teaching practices, of how these teaching conceptions relate to teaching practices, and in turn, how teaching practices relate to the way in which students approach learning new musical works. Teachers' conceptions are linked not only to student learning, but also to their conceptions of learning (López-Íñiguez & Pozo, *submitted*), and perhaps also to their learning practices, but it is important to know which learning and teaching activities in fact connect them all.

All this leads us to a final reflection upon the change in teaching practices, which, as we mentioned at the beginning, based on data from studies such as TALIS (OECD, 2009) are essential to educational change. If there is evidence that students can be taught to adopt efficient metacognitive strategies during practice with the aim of interpreting a work (Bathgate, Sims-Knight, & Schunn, 2001), if complex matters such as the analysis of a work are really important in musical interpretation and practice (Vaughan, 2002), and if teachers' profiles in their instruction practices and conceptions influence the way in which students conceive learning (López-Íñiguez & Pozo, *submitted*), then change in teachers' conceptions should be considered as one of the essential components in the training of, in this case,

teachers of music. If teachers' conceptions predict how their students are going to understand a musical score, then in order to improve teaching practices, it is essential to have an incidence on training processes that aim to change these conceptions, no doubt by means of reflection on their own practice as teachers but also as learners of music. This would also require further research on the complex relations between conceptions and practices of learning and teaching.

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## **Appendix**

## "Gotas de lluvia en un día soleado"

$\text{♩} = 60$  G. López (1876)

1 2 1 0 1 2 0 4

*f*

5 *pizz.*  
1 2 4 1 0 1 2 0

*p*

9 *arco*  
1 2 1 0 1 2 0 4

*f*