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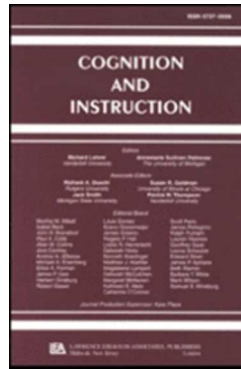
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Like teacher, like student? Conceptions of children from traditional and constructive teaching models regarding the teaching and learning of string instruments

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Abstract

More and more studies are dealing with the association between teachers’ and students’ conceptions of learning and teaching and their actual practices in the classroom. Nevertheless, few studies have directly researched the influence of teachers’ conceptions on those held by their students. Our primary objective was to analyze the influence of music teachers’ conceptions on the ideas held by their students regarding learning and teaching. We interviewed 60 children: 30 with teachers who held traditional conceptions of teaching and learning and 30 with teachers who held constructive conceptions. Data were collected using a structured interview after viewing videos in which the actors depicted instrument lessons corresponding to the three conceptions of teaching and learning identified in previous studies – *direct*, *interpretative* and *constructive*. The first analysis (ANOVA) was quantitative and considered the choice of videos. The second analysis was qualitative (lexicometric analysis), based on the explanations for those choices. The results showed that students reflected the conceptions corresponding to their teachers’ profiles. The explanations from students in the constructive group were longer and more elaborate, focusing on learning processes and conditions as well as on student autonomy, whereas the traditional group focused on outcomes and responding to the teacher’s instructions.

Key Words: children’s conceptions of learning and instruction; conceptual change; constructivism; music conservatoires; music education; teachers’ conceptions of learning and instruction

Introduction

Some of the most relevant factors in the change in teaching and learning practices are the conceptions held by educational agents regarding what happens in the classroom, what the goals of the activities are, expectations for the achievement of goals and the best ways to tackle tasks. This is even more important for supporting models such as those based on the constructivist approach, which transfer much of the control of learning to the student. As noted by Olson and Bruner (1996, p. 25) with reference to internalization of the learning focus:

“What changes as we move from the simplest pedagogies to the most sophisticated, is the development of an increasingly internalist or insider’s view of thinking, learning, and knowing. Externalist theories focus on what an adult can do to foster learning – a view that makes up the bulk of traditional educational psychology. Internalist theories, on the other hand, focus on what children can do, or what they think they are doing, and how learning can be premised on those intentional states”.

Thus, implementing teaching strategies that focus on the students themselves taking on more control of learning requires not only a change in teaching methodology but also that educational agents (teachers and learners) should conceive of learning as an internalized process which depends on the constructive activity of the learners.

In this regard, there has been increasing interest over recent years in studying the conceptions of learning and teaching held by teachers and students in different fields of learning (Martín, Pozo, Mateos, Martín & Pérez Echeverría, submitted; Olafson & Schraw, 2006; Pozo, Scheuer, Pérez Echeverría, Mateos, Martín & De la Cruz, 2006; Scheuer, De la Cruz, Pozo, Huarte & Sola, 2006a; Scheuer, De la Cruz, Pozo & Neira, 2006b; Scheuer, De

la Cruz, Pozo & Huarte, 2009; Strauss & Shilony, 1994; Tsai, 2002), and the way in which these conceptions may influence classroom practices (De la Cruz, Pozo, Huarte & Scheuer, 2006; Tikva, 2010).

Most of these studies assume that these conceptions are acquired implicitly as a result of everyday teaching and learning practices. However, few studies have attempted to show the relationship between the conceptions of teachers and those of their learners. In this study, using 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, we propose to test the influence of teachers' conceptions on those of learners.

Conceptions of learning and teaching

Thirty years ago, Pramling (1983) proposed that as children learn, they not only acquire specific knowledge but also generate and develop conceptions regarding how they learn and what they learn. In a phenomenographic study, she asked three to eight years old children to think about how they learn specific tasks, finding that their conceptions of learning progressed from conceiving of learning as doing to conceiving of it as knowing and, in a further level, as understanding. These children would move from holding an *externalist* conception of learning as the result of knowledge transmission from an external influence (teacher) towards an *internalist* conception, in which, at a more basic stage, learning would take place through experience, and would later be achieved through personal reflection.

Moreover, when children take on the role of teacher with their peers, they seem to show the same conceptions. Thus, in a study of children aged three to five years, Strauss, Ziv and Stein (2002) found important associations between the theory of the mind and

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3 conceptions of teaching, as well as a clear development pattern. Although the children in both
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5 age groups used teaching strategies combining demonstration by action with verbal
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7 explanation, demonstration prevailed among the younger children, while verbal explanation
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9 prevailed among the older ones. In addition, only the older children said they took into
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11 account actions performed by the learner and asked explicitly about his/her understanding
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13 and remembering of the rules of the game. These differences were maintained upon
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15 explaining how they had taught: for younger children, the core of teaching was demonstration,
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17 while for the older children it was explanation, indicating developmental change from
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19 focusing on behavioral aspects to attention to the mental states involved, specifically
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21 knowledge and understanding. Together, the results of this study support the idea that both
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23 the understanding of teaching and effective teaching strategies change during pre-school
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25 years, and that these changes correspond to changes in the theory of the mind.
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31 Similarly, a series of studies on the conceptions of learning held by children in
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33 different settings, such as the acquisition of writing or drawing (Scheuer, De la Cruz & Pozo,
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35 2002, Scheuer et al., 2006a, 2006b, 2009) found that in younger children, as from four years
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37 of age, prevailing conceptions consisted of a kind of naïve behaviorism, a direct conception
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39 of learning centered only on outcomes, without taking into account the psychological process
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41 that enable this learning. Older children, as from five or six years of age, identified the
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43 mediation of some psychological processes needed for learning (such as attention or
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45 motivation) but always under adult supervision, while the eldest, aged nine or ten years,
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47 seemed to hold more complex conceptions with increasingly cognitive learner autonomy.
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49 Thus, children's conceptions of learning seem to change with age, and perhaps instruction, in
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51 three dimensions (Scheuer et al., 2006b): they become increasingly complex (by considering
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53 a larger number of factors and conditions), more dynamic (by increasing the associations
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55 among those factors) and more internalized (endowing the learner with greater autonomy).
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But what are the characteristics of these conceptions? To answer this question, we will describe each conception of teaching and learning, based on both the psychological-educational literature that has studied them and which we have been describing, and on research focusing specifically on the musical setting.

Conceptions at music conservatories

Various recent studies on learners of musical instruments have dealt with conceptions of teaching and learning held both by music teachers (Bautista, Pérez Echeverría & Pozo, 2010; López-Íñiguez, Pozo & de Dios, in press) and intermediate/advanced students (Bautista, Pérez Echeverría, Pozo & Brizuela, 2012; Casas, Pozo & Montero, submitted; Marín, Scheuer & Pérez-Echeverría, in press). However, with the exception of a few exploratory studies on young children learning arts (see, for example, from the theoretical framework of developmental psychology, the work of Pramling Samuelsson, Carlsson, Olsson, Pramling & Wallerstedt (2009)), there is very little in the literature about children's' conceptions in the instrumental-musical setting. Therefore, as this paper proposes to study how teachers influence their students' conceptions in a one-to-one lesson setting, we need to know what the conceptions of young students are regarding how a string instrument is taught and learned, more specifically, children encountering the instrument for the first time at music conservatories.

Based on some of these prior papers as well as on our own research, the following sections describe the main features of the three conceptions which have been identified: direct, interpretative and constructive.

Direct conception

The direct conception, which is simpler, closer to naïve behaviorism and similar to Wellman's (1990) *direct copy theory*, claims that there is a direct causal relationship between teaching conditions and the desired outcome. It therefore teaches the final product sought (in our case, the music score) in a direct manner (in line with naïve behaviorism). The role of the teacher is to expose the student to external learning contents as clearly as possible, though without explicit instruction, so that the student will incorporate or accumulate them through adequate practice (Scheuer et al., 2002, 2006a, 2006b) – in the terms of Pramling (1996) “traditionally”. Teaching is a one-directional monologue which seeks the performance *ad pedem litterae* of the tunes, works, studies and/or exercises, which are conceived from a radical epistemological realism. Figure 1 illustrates the most traditional or direct version of teaching-learning cello at music conservatories, showing that both teacher and student focus exclusively on playing the score, with the teacher following it to check that the student is playing the notes correctly, regardless of her mental processes.

Figure 1

Interpretative Conception

Following Pozo and Scheuer (1999), the interpretative conception considers the existence of complex, dynamic mental processes in the learner (e.g., deliberate observation, memory or evaluation), which mediate learning, although it is believed that they should be controlled by the teacher. It is a more complex version of the direct conception (López-Íñiguez, Pozo & de Dios, in press). The teacher's role is thus to regulate externally the mental and motor procedures involved in the student's instrument playing, with the aim of getting

the student to play the score faithfully, and is also interpreted from a certain epistemological realism. The role of the student is active, though reproductive, accepting his/her condition as the agent of his/her own learning (Scheuer & Pozo, 2006). The teaching objective is that the student should achieve technical and conceptual mastery of the music being played, as a means to play the piece in the most academically correct way. This is shown in Figure 2, in which both the teacher and the student focus on the technical execution needed in order to play the graphic symbols on the score precisely, as occurs in the direct conception. The illustration shows the student looking carefully at the music stand, similarly to Figure 1, but here with verbal explicitation from the teacher, who points out the technical requirements that the student must perform actively in order to be able to play the piece.

Figure 2

Constructive Conception

The constructive conception would faithfully represent Olson and Burner’s (1996) “meeting of minds” in that in contrast to the other two conceptions, and following Pramling (1996), the student would learn “experientially”. Thus, the principles involved in the constructive conception – a product of the knowledge generated during recent decades by psychological, philosophical, pedagogical and educational research – contrast radically with the claims of previous learning cultures. Teaching according to this conception involves activating, stimulating and developing the student’s mental processes through reflection. The goal is that the student should learn to regulate and manage his/her own cognitive and motor processes, and to construct a personal representation of the music he/she plays. The student’s role is thus active and constructive (based on epistemological constructivism), in such a way

that the role of the teacher is to guide and supervise the start-up of the student's reflective, metacognitive, emotional and affective processes as the primary way to foster his/her understanding and autonomy. Teaching focuses on the interactive relationship among the student, the teacher and the learning material or instrument, as shown in Figure 3, where teacher and student actively converse about what aspects might help the student to learn and play, not only the score on the music stand (at its symbolic, stylistic, analytic and referential levels), but also other scores in which the learning material is similar, so that he/she can transfer the knowledge acquired consciously and constructively in this piece to other pieces.

Figure 3

We interpret the conceptual change from one theory to another as a process of hierarchical integration involving increasing complexity, dynamization and internalization of the agent (Scheuer, Pozo, De la Cruz, & Baccalá, 2001; Scheuer et al., 2002), similar to the trend proposed by Dienes and Perner (1999) in their theory of knowledge as a progressive process and hierarchical explication of the three knowledge components: content, attitude and self. Thus, and seeking a parallel to the results obtained in the study of learning to draw by Scheuer et al. (2006a), the youngest music students would talk about what notes they have to learn (content) in order to play the instrument. Slightly older students respond similarly, although they also seem to take into account their own mental processes regarding how they actually learn to play those notes (attitude). Finally, the eldest children are capable of explaining in an autobiographical narrative, which processes are involved in playing, how to supervise and make changes in their own practice, and their feelings or what implicit message they find in the music they play (self).

Factors that influence development and change in students' conceptions

From the theoretical framework that views conceptions as implicit theories (Pozo, et al., 2006; Strauss & Shilony, 1994; Strauss, Ziv & Stein, 2002), it is assumed that the conceptions are acquired implicitly, that students take them in during their own practice of learning and teaching, and that they change over time. We therefore ask: What are the factors that promote this conceptual change?

In a study of piano students using a multiple choice questionnaire of typical learning-teaching scenarios at music conservatories, Bautista et al. (2012) found that the three conceptions described above characterized the way those students thought about teaching, learning and evaluation, and that those conceptions became more complex, progressing from direct to interpretative to constructive, with increasing age and level, two variables which are difficult to separate in music learning settings. In a later study, Marin et al. (2012) found similar results, with student conceptions growing more complex according to the same age/instructional level variable.

However, along with this possible effect of age and/or years' instruction, it may be assumed that there should also be an effect not only of quantity of practice during instrument learning, but also of the quality of this practice and the kind of instruction imparted to the students. Indeed, most studies on teachers show that most of them do not hold a constructive conception, and the results found for students are very similar.

In fact, the different approaches that examine conceptions have for years supported the hypothesis that conceptions are somehow transferred from teachers to students, as a result of daily contact with instruction in specific domains of knowledge. Thus, it is understood that the representations held by teachers regarding teaching and learning their subject are

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3 somehow transferred to the students, who gradually take them in until they consider them as
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5 natural and their own.
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9 However, with a few exceptions (Tikva, 2010), there is very little empirical research
10 on the issue. One of those exceptions is Pramling's (1996) phenomenographic study, in which
11 she observed that when five- and six-year-olds were trained using a metacognitive approach
12 (which she called *experiential*), they adopted more sophisticated conceptions of learning,
13 although to a limited extent, since most of these children understood learning as “learning to
14 know”, and very few understood it as “learning to understand”. However, it is worth noting
15 that children trained using a traditional approach in the same experiment held the belief that
16 learning is in fact “learning to do”.
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27 Our study attempts to test by means of a *quasi experimental* method whether the
28 conceptions held by teachers really influence those held by learners at music conservatories
29 during childhood, adding the teaching model which they come from, specifically the most
30 extreme: from traditional to constructive, or, in Pramling's (1996) terms, to analyze whether
31 the students learn traditionally vs. experientially according to the teaching profile of their
32 instructors.
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41 In addition, this study seeks to continue the work of authors in different educational
42 settings regarding the conceptions of children at earlier ages. It seeks to test whether, as has
43 been shown to date, children hold simpler conceptions during the first years and whether
44 these conceptions evolve a few years later towards more interpretative conceptions (in line
45 with the findings of Scheuer et al., 2006a), with constructive conceptions being very scarce,
46 as predicted by these previous studies (Pozo et al. 2006; Strauss & Shilony, 1994; Strauss,
47 Ziv & Stein, 2002); or whether more complex conceptions can be found in students exposed
48 to more complex teaching models, which, as claimed by Entwistle, Skinner and Orr (2000),
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conceive of teaching as an epistemic student-centered form focused on learning processes, or more specifically, metacognitive processes, which articulate and lend meaning to the different pedagogical stages upon which lessons are structured.

With regard to the above, and following Scheuer et al. (2006b), who structured the analyses in their study of children on four key moments of writing (anticipating, writing, revising and rereading), we thought it would be interesting to structure the classes on different pedagogical stages, namely the three essential stages of individual music lessons proposed by Torrado and Pozo (2008) based on the classical models of metacognition (Mateos, 2001): planning (when the student selects and organizes the points to work on, in class or at home), supervision (when points to be improved are worked on during the lesson or after the student has studied at home) and evaluation (usually, when the degree to which the student has learned and achieved the teaching objectives is analyzed, at any point during the class).

Objectives

The main objective was to analyze the influence of the *teaching model* in which learning takes place (traditional vs. constructive) and *level of musical instruction* (1st Elementary Level and 4th Elementary Level) on students’ conceptions of learning and teaching music (direct, interpretative or constructive) – according to the analysis of choices and rejections in the video task described in Materials – to determine whether, according to these variables, elementary students at music conservatories differ in their conception of teaching and learning string instruments. Specifically, according to the theoretical analysis in the Introduction, we want to find out whether the differences in conceptions are related to age or instructional level, or rather, to the teaching model they are included in.

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3 The second objective was to examine whether there are differences in children's
4 conceptions of the three stages of dyadic teacher-student interaction in instrument lessons:
5 planning, supervision and evaluation, according to the independent variables mentioned
6 above.
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12 In addition to analyzing the conceptions preferred by students, which might only
13 reflect acceptance of the teaching situations or contexts most familiar to them, we are also
14 interested in how they explain their beliefs or preferences. Therefore, in order to gain in-
15 depth understanding and describe the nature of the results of the above objectives, and to find
16 points in common through quantitative and qualitative research methods, we sought to
17 analyze whether participants' lexicon could be grouped according to the same variables –
18 *teaching model* and *instruction level*, in order to produce a qualitative description of
19 children's verbal explanations for their choices and rejections by using the features of their
20 most characteristic or prototypical explanations during the video viewing tasks.
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37 Method

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43 Based on a preliminary study (reference omitted for masked review) in which
44 teaching profiles were assigned to music teachers according to their conceptions of teaching
45 and learning string instruments, we considered students of the teachers who were selected as
46 the most representative and "extreme" of the two most opposite conceptions – direct and
47 constructive. We selected 12 teachers – 6 for each conception, and 60 students who had
48 studied only with those 12 teachers and were enrolled in the Elementary Level (E.L.), so that
49 their ages were 8 to 9 years for 1st E.L. and 11 to 12 years for 4th E.L. ($M = 9$ years, 10
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months; $SD=$ 1 year, 8 months; Gender= 18♂42♀). Thirty of these students studied with teachers who used a *traditional teaching model* (the 6 representatives of the direct teaching-learning conception) while the other 30 studied with teachers who used a *constructive teaching model*, at 10 music conservatories in four different regions of Spain. For analysis, the students were distributed according to their instructors' *teaching model* (traditional vs. constructive) and their *instructional level* (1st E.L. or 4th E.L.), as shown in Table 1:

Table 1

Tasks

The data were collected at individual structured, video-recorded interviews lasting approximately one hour. The participants viewed 9 short videos, lasting 2-3 minutes each, in which a teacher and a student attempt to resolve a tuning problem on a cello, during three *stages* of a typical conservatory lesson: planning, supervision and evaluation. There were 3 videos for each *stage*, depicting the three conceptions described in the Introduction. (Phrase omitted for masked review). The videos may be viewed as a supplementary material online at <https://vimeo.com/psycellogy> (password: watchingauthorized9). They show dialogues between teacher and student (see Appendices), for which the scripts were developed at various discussion sessions with experts, during which full interjudge agreement was achieved for the identification of each situation and its corresponding theory. From each group of three videos, the children were asked to select which one showed how they believed they learned best and worst at each *stage*, and to explain their responses verbally.

Procedure

We contacted the teachers selected to let them know that we wanted to continue to research their students. Parents of the students (as described in the Sample section) were contacted to request cooperation. They were asked for authorization after being informed in writing that a one-hour interview would be video-recorded, with only the researcher and the student present. Participation was voluntary and unpaid, and 83% accepted to take part. Six of the children were interviewed at their homes, because the parents so preferred. After a few introductory questions, three videos (corresponding to the direct, interpretative and constructive conceptions) for each *stage* (planning, supervision and evaluation) were viewed in random order. After each *stage* the child was asked to select the video that he/she considered best and worst for learning to solve the tuning problem, and to explain both answers.

Design

This was a simple prospective *ex post facto* cross-sectional study. The dependent variable *video preference* (direct, interpretative and constructive) was contrasted to the independent variables *teaching model* (traditional or constructive), *instructional level* ((a) *1st course* and (b) *4th course*), and *stage* ((1) *Planning*, (2) *Supervision* and (3) *Evaluation*).

3.5. Analysis

A score was assigned to each participant according to his/her preference in each block of videos in general; (each block consists of the three video stages for each conception, so

that there are three blocks: 1) block of three videos for the direct conception; 2) block of three videos for the interpretative conception and 3) block of three videos for the constructive conception), and for each video in each stage separately. Thus, by adding one point for each video selected and subtracting one point for each rejection, the scores were 3 to -3 in the block *video preference in general* (first objective) and 1 to -1 in the block *video preference by stages* (second objective). Once the scores were assigned, the data were analyzed in five phases. The first two phases corresponded to the first two objectives, while the last three phases corresponded to the third objective. First, two analyses of variance were performed for the first objective, 2 (*teaching model*) x 3 (*video preference in general*), 2 (*instructional level*) x 3 (*video preference in general*). Another analysis of variance was performed for the second objective, 2 (*teaching model*) x 3 (*video preference by stages*), using the repeated measures model to test the extent to which the video preference would be affected by the variables *teaching model* and *instructional level*, and to examine the details for each stage of the significant resulting variable.

The first two stages, which are quantitative, were performed using SPSS version 19.0 statistical analysis software.

For the third objective we performed two *Factorial Correspondence Analyses (FCAs)* on the lexical tables. The *CORBI* procedure was used to test the lexical differentiation hypothesis considering the modalities of the active variable (*teaching model* – traditional vs. constructive) and the illustrative variable (*instructional level* – 1st E.L. vs. 4th E.L.), and of grouping of individuals. Then we applied the *CORBIT* procedure to show the lexical groups of the modalities whose contribution was greater than average, and which considered the same modalities for the active and illustrative variable, as well as the modalities of the word

variable. After the two *FCAs*, we continued with *VOSPEC* procedure, to put the explanations into hierarchical order according to their degree of prototypicality.

As a brief explanation in order to understand the three phases in lexicometric analysis, it should be mentioned that the basic component of *FCA* analysis is a lexical table or contingency table in which the rows correspond to all participants (in our case, the 60 children) and the columns correspond to the different words in the *corpus* which meet certain criteria or *filters*. In this case we decided to apply a single *frequency threshold* to the whole corpus, to eliminate words that are rare in the corpus, retaining only those with a relatively high frequency (in this case, 11 or more), so that out of the 1012 original different words, our corpus was reduced to 97.

For the *VOSPEC* procedure we used *Automatic Selection of Modal Responses (ASMR)* and their qualitative description. Once the *FCAs* in the two previous stages distinguish between the modalities of the active variable (*traditional teaching model* and *constructive teaching model*), the *Automatic Selection of Modal or Typical Responses* procedure is applied according to the criterion χ^2 (which is suitable for fairly extensive explanations). It was important and useful to apply this procedure because, as mentioned above, it allowed us to place all the explanations provided by participants in hierarchical order according to their prototypicality, i.e., the explanation at the top of the list would be the nearest to the center of gravity of this part of the *corpus*. Thus, considering several of the most typical modal explanations for each text (since one alone does not suffice to summarize the information provided by the text), it was possible to infer the meanings of the *lexical groups* in the context they were originally produced in, and to make a qualitative description of the most typical features of each group formed.

The third stage was conducted using the WinSPAD data analysis software version 5.5 (manufactured by Décisia), because of its qualitative characteristics.

Results

To present the results, we will begin with a brief description of student choices and rejections in each age group and teaching model group, regarding each of the conceptions represented in the videos, in order to show the probability of each conception appearing. Then we will describe the quantitative part of the study, with the analysis of variance stage, in order to test the effect of the *teaching model* and *instructional level* on the students' *preferred videos*, for all three videos representing each conception as well as for each individual stage (planning, supervision and evaluation). Lastly, we will focus on the more qualitative part of the analysis and describe the factorial correspondence analyses for lexical differentiation and grouping individuals in two stages (*CORBI* and *CORBIT*), and conclude with the qualitative description of participants' most typical explanations according to the *VOSPEC* procedure.

For a global approach to the data, Table 2 shows the results of video choices and rejections according to *teaching model* and *instructional level*:

Table 2

Based on these rates of acceptance and rejection of each conception, and according to our first two objectives, we shall describe which variables influence student conceptions. After analyzing the three variables, we shall continue with the analysis of possible differences or similarities among the three pedagogical stages in our study.

Which variables influence the students' conceptions?

As mentioned above, we are interested in analyzing the effect that *teaching model* and *instructional level* might have on students' conceptions. To determine what significant effects the *teaching model* has on *general video preference*, an analysis of variance was performed, which was significant $F(2, 116) = 59.43, p < .001, \eta^2 = .506$, *direct videos* $M = -1.02$ (*traditional* $M = 0.4$; *constructive* $M = -2.43$), *interpretative videos* $M = 0.27$ (*traditional* $M = -0.57$; *constructive* $M = -0.03$), *constructive videos* $M = .75$ (*traditional* $M = -0.97$; *constructive* $M = 2.47$), as shown in the following figure:

Figure 4

A second analysis of variance was performed to analyze the significant effects of *instructional level* on *general preference*. It was found not to be significant, $F(2, 116) = 0.651, p = .524, \eta^2 = .011$.

Based on these analyses, we decided to continue with our second objective, to test the effects of the variable which was found to be significant, *teaching model*, on *general video preference*, but this time on *video preference by stages*.

Planning Stage

For our second objective, we performed an ANOVA, which showed that *teaching model* has a significant effect on *video preference for the planning stage*, $F(2, 116) = 19.23, p < .001$, *direct video* $M = -0.43$ (*MD Traditional* $M = 0.13$; *MD Constructive* $M = -1.0$),

interpretative video $M= 0.08$ (MD traditional $M= 0.17$; MD constructive $M= 0.00$),
constructive $M= 0.32$ (MD traditional $M= -0.37$; MD constructive $M= 1.0$), $\eta^2= .472$.

Figure 5

Supervision Stage

Here again, the ANOVA showed that *teaching model* has significant effects on *video preference for the supervision stage*, $F(2, 116)= 3.06$, $p< .001$, *direct video* $M= -.2$ (MD traditional $M= .17$; MD constructive $M= -.57$), *interpretative video* $M= .00$ (MD traditional $M= .13$; MD constructive $M= -.13$), *constructive video* $M= .2$ (MD traditional $M= -.3$; MD constructive $M= .7$), $\eta^2= .209$.

Figure 6

Evaluation Stage

ANOVA showed that *teaching model* has a significant effect on *video preference for the evaluation stage*, $F(2, 116)= 10.34$, $p< .001$, *direct video* $M= -.38$ (MD traditional $M= .1$; MD constructive $M= -.87$), *interpretative video* $M= .15$ (MD traditional $M= .2$; MD constructive $M= .1$), *constructive video* $M= .23$ (MD traditional $M= -.3$; MD constructive $M= .77$), $\eta^2= .293$.

Figure 7

The lexicometrical qualitative approach: how did students explain their preferences?

As mentioned above, given that preferences and rejections could be interpreted in terms of simple emulation of the teaching actions or contexts that children are most familiar with according to the teaching model they have been exposed to, we believe that a deeper analysis is needed of the explanations for the choices, in order to determine whether they reflect true understanding and assimilation and are not simply learned by imitation. We therefore performed a qualitative analysis on the content of those explanations using lexicometrical analysis, which, according to Baccalá, De la Cruz and Scheuer (2002), provides a substantially different way of analyzing and interpreting people's verbal discourse compared to the traditional methods in our setting (categorical analyses), by determining the most representative answers from participants according to statistical criteria and not to categories established "a priori". This prevents the most implicit part of discourse – the emotional and sentimental charge (Bécue, 1991) – from being missed. In our opinion, this "progressive spiraling" analysis (Baccalá et al., 2002) helps keep us within our theoretical starting assumptions and empirical evidence. Because lexicometry has not often been used in educational psychology research, we shall describe each stage in detail. (For an in-depth description, see Bécue, 2000).

The initial corpus of all the explanations that children provided for their video selections and rejections consisted of 12200 *total* words, with 1012 *different* words. After applying the frequency threshold =11, the corpus was reduced to 9448 *total* words and 97 *different* words.

The first two FCA factorial axes were considered because the decrease in the percentage of explained inertia was more considerable between them than from the rest of the axes, as shown in the following figure, at the end of the lines of asterisks.

Figure 8

The results of the first FCA applied to the lexical table showed that the variables *traditional teaching model* and *constructive teaching model* reached the test value ($\geq \pm 1.96$) on the first and/or second factorial axes for global children’s discourse, while the variable *instructional level* did not. This shows that the lexicon differs significantly ($p = .05$) between groups according to the *teaching model* they belong to, but not to their level or age, thus proving that there are significant lexical differences between students from different *teaching models* but from different *instructional levels*.

Table 3

Figure 9 shows the factorial plane formed by Axes 1 and 2 with the participants who had a higher than average contribution (> 1.67). Students from the *traditional teaching model* are represented by a T and students from the *constructive model* are represented by a C. The groups are fairly homogenous, since the two constructive participants (C22 and C53) at the upper left and lower right of the *traditional teaching model* plane are the farthest from its center of gravity. The same is true for the three traditional participants (T10, T33 and T34) located in the constructive group.

Figure 9

Figure 10 shows the factorial plane formed by Axes 1 and 2 with the words that had higher than average contribution (> 1.03). Although all the words that appear in the graph are contributive, the ones marked with a larger dot made the greatest contribution, and would therefore be more representative of each lexical group.

Figure 10

The analysis of the two factorial planes enabled two well-differentiated lexical groups to be distinguished, related to the *teaching model* they belong to, both in the way participants were grouped and in their use of vocabulary. The groups are as follows:

- **Traditional Group:** associated with the following participants: T4, T11, T12, T13, T15, T18, C22, T35, T39 and C53; and the next contributive words: *(to) be similar to, because, (to) believe, (to) change, (to) correct, doubts, exam, examples, (to) explain, (to) fail, finger, (to) get it right, (to) get the hand up, (to) have, (to) help, “maestro”, (to) make sure, mistakes, (to) place, (to) play out of tune, position, problem, (to) put, (to) realize, (to) rectify, same, (to) show, (to) stop, student, (to) teach, way, week, well and where?*
- **Constructive Group:** associated with these participants: C5, T10, C19, T33, T34, C41, C44, C47, C48, C50 and C57; and these contributive words: *advices, (to) ask,*

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brain, (to) bring, (to) focus on sth, her, (to) imagine, (to) learn, lesson, (to) let the student do, limit, (to) listen to sth, (to) memorize, more, nothing, (to) sing, (to) study, (to) think, what? and wrong.

Finally, the *Automatic Selection of Modal Responses* procedure was applied to select students’ most characteristic responses according to the variable *teaching model*, and the statistic *chi-squared* (χ^2), which produced significant results (range of χ^2 distance: *traditional group* .731 to .837; *constructive group* .703 to .820).

Below we provide a qualitative description of participants’ answers, in which all the examples are real excerpts from their discourse. Contributive words are highlighted in bold. The interviews were conducted in Spanish, and only the contributive words that appeared in the original interviews are highlighted in bold. Any additional occurrences of these words due to translation have not been highlighted. A double slash (//) separates answers from different students.

Traditional Group

One of the most noticeable features in the lexicon used by the traditional group is that learning to play the instrument revolves around the figure of the “maestro”, a word used by these children to describe their favorite teacher in the videos, conferring upon her a superior position in the class hierarchy. It seems that it is possible to learn to play an instrument simply by exposure to the “maestra’s” explanations and that the complex underlying process will be understood automatically ((...) **because** if for example, a **maestro** doesn’t **explain** it to you, you’ll do it wrong, and she has to **explain** a lot to her so that she’ll do it **well**. // I **think**

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3 *it would be better the way I said, to, um... so that she wouldn't be so confused alone, first she*
4 ***explains** and then she understands it and plays it).* Moreover, modeling plays a major part in
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*teaching a scale, indeed, these students reject the constructive video because the teacher does not demonstrate what should be done (**Because I think** that she didn't tell her that she should **place** her hand more this way, and didn't **show** her how to do it, she only told her she should know how to do it and that's all).*

These children believe that a good teacher should immediately correct students' errors so that they will not become bad habits and will not interrupt the evolution of learning (***Because she corrects** her **mistakes** and, and **helps** her to tune better. // Sometimes I don't like it **because** she doesn't **correct** the hand much either, so, well... // **Because** she has told her where... where her **mistake** is, and made her **correct it**, made her **correct** the **position** she did badly, she told her what the **positions** were and all that. // (...) and didn't **correct** her and they didn't do it together. // **Because** the girl won't know how to do it alone without **help** and may acquire bad habits, the **maestra** should **explain** things, she's the one who knows).*

In this regard, it is in error correction that these children seem to show greatest autonomy ((...) you have to be sure **where** your **finger** is and you mustn't repeat it, once you know the **error** you mustn't repeat it. // **Because** the girl **corrected**, um... she was no longer **out of tune**, because for example, she played the note very badly but she **corrected** it). Although in fact the autonomy is not really such, and the students clearly understand that when they do not know how to do something, it is better to ask the teacher directly, taking on again the role of non-autonomous student in class or while studying at home (*On the first day, she told her to do the scale again and on the second day she didn't ask about the **doubts** she had and didn't know if it was high or low, and she didn't ask about her **doubts**. // If you have a **doubt** you should ask the teacher, she has to clarify the **doubts** (...)).*

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3 In addition, these learning problems usually appear with regard to the tuning of the
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5 scale or the exact reproduction of the sound (Bautista & Pérez Echeverría, 2008) (*Because*
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7 *the teacher helps her a lot not to play out of tune, because she places her finger well and*
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9 *they go... when she plays the note she hears it and when she plays out of tune she will try, she*
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11 *will move her finger. // Because then she realizes that she's out of tune because the teacher*
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13 *tells her to repeat it and then it comes out a little better*), and are usually associated to
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15 incorrect placing of the hand /finger/position, rather than being related to the internal
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17 listening processes needed for the child to understand why the scale was out of tune (*Because*
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19 *she tells her where to place her fingers and...and all that, because she tells her where to*
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21 *place her fingers and to do it again, and so on, all the time until it comes out well. // Because*
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23 *she placed the girl's hand the way it should be placed. // Instead of just telling her that she's*
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25 *going too high or too low, he places a "stop" for the finger so... so that she will know where,*
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27 *where it is, and now she knows, now she remembers as if she had a block so that she doesn't*
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29 *go too far up or down*).

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35 The participants from the traditional group tend to agree regarding how to correct
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37 notes that are out of tune, which, as mentioned above, is not related to the ideal, more
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39 constructive internal listening followed by a comprehensive learning process relating it to the
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41 placement and pressure of the finger on the fingerboard. Instead, it is determined by the place
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43 where the hand or finger should go, without mediation of either listening or the
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45 comprehensive process, but only the exact production of the notes of the scale ((...) *she has*
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47 *to make the note go up quite a lot, a lot... because otherwise, it will sound out of tune and*
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49 *she's made it lower. // When you're playing and you don't pay attention to your hand, you*
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51 *don't hear that it's out of tune so much, and you don't hear it so out of tune as other people*
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53 *do. // (...) I can't play a G major scale and place the A on a C, I have to know where my hand*
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55 *should go, where the first position is, where the third finger is (...)*), or by repetitive practice,
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an activity which becomes an order from the teacher, without the mediation of the processes necessary for the child to understand why (*Because she's demanding, but that's what has to be done because otherwise the student won't hold it well and, because she's...she's making her repeat it and repeat it and repeat it until she gets it, because, um... she explained, she stopped her at the right moment when she did it wrong, she explained, in other words she explained what she had to do, she corrected many, many times. // She's explaining it to her a little better because she makes her repeat*).

Finally, with regard to the all above, the main and only reason why the teacher corrects, explains, selects contents and is the only mediating learning agent in her students' learning is to achieve good results in the exam (*She tells her to be careful with the tuning, to... to work on it well at home, so she can do it for the exam in two weeks' time. // Because she tells her to place her fingers for the exam next week*), which seems to create in the students a desire to please the teacher by achieving the aim, thus their motivation is extrinsic (*(...) so the teacher can see you're doing it well (...) // Because the maestra always tells you what you do badly and what you do well, and this one did it nearly every time*), which in turn seems to create insecurity in the children due to the external evaluation (*I'm nervous about the exam to move up to the next level*), and rejection of students who play out of tune, do not correct, or do not study enough (*Because she doesn't study the scale for next week. // She didn't correct, she hadn't studied any more and she played more out of tune*).

Constructive Group

The children in this lexical group clearly understand that a good teacher should help and guide her students in the learning and studying process both by providing advice about

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3 how to do things – which is different from imposing the way they should be done, as happens
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5 in the other group – and by asking students for their opinion on how and what to study ((...)
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7 *because there's a lot of **advice**, very important, because of her experience and all. // Because*
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9 *the girl **asks** how things should be **studied**, to get an idea of where each thing has to go in its*
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11 *place).*

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15 Indeed, upon rejecting the more traditional videos, they explain that if the teacher only
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17 corrects but does not help the child to reflect upon what has happened or how to solve things
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19 so that the child herself realizes what has happened and which of her own resources to use,
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21 learning will not take place (*Because she says "listen to me and then you do it", and like she*
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23 *doesn't correct her much, because you **learn** things if you do them **badly** so you make a*
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25 *mistake, because if you do them **badly** and someone corrects you, in the end you don't **learn***
26
27 *and all this // Because she said "very good" and "see you next week", and that doesn't work,*
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29 *because she says yes, she says very good, she says **study** these things at home, but she doesn't*
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31 *give any **advice** and she doesn't **ask** the girl // Well, that the teacher made... made the girl*
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33 ***think**, what you can't do is not **let her think** and tell her everything yourself, I mean, you*
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35 *have to **let her think**).*

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40 These children still explain the need for the teacher to be a guide in their learning
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42 process, a figure who will ask them questions and help them think for themselves about their
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44 processes, usually represented by attention to the task and concentration on studying. (*She*
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46 ***asks her** herself if she knows what needs to be **studied** so that she'll pay attention. // I think*
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48 *she should have told her... I don't know... something **more**, something like how **she** could*
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50 *have **studied** it at home, **focus** a little **more** on how she could have **studied** it. // (...) she*
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52 *explains that if she sees clearly what the mistake was, she could improve at home and she*
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54 *could **study** it better, she'd **focus** better on what she has to do for the tune).*

Moreover, these processes should be done autonomously, using, for example, recovery and transfer ((...) *and then **she** acts as teacher, so that later, when she plays the cello, she'll also do what **she** says, because while she plays, she'll remember what **she** said (...) she said "**imagine something**", so then she remembers it when she's playing and says "**imagine the A in my head**", and then she does it well*).

The learning process is also viewed, in the words of Schön, as "reflection in action", and not as mere repetitive practice (*I like the way of teaching **more** because the teacher makes her reflect, makes **her** reflect on how she should do it, and **she** answers, and that way you **learn** much **more**, I mean, if they tell you what to do, well, you do it, but if you realize what you have done **badly** and what you should do, well, it's much better, because you **learn more** that way; because in the others you **learn** too, but you **learn** to know your errors (...) //* (...) *and **she** **thinks** of it in her head and does it slowly //* *Because she tells her to do **something**, and that's it, to repeat it and repeat it, and she makes a "**stop**" and that doesn't help her **more***).

According to these children, this type of guided, reflexive practice has direct incidence on their disposition/attitude to study (*Because it's as if the teacher tells her how they have to **learn** and the girl knows **more**, the student knows **more**, um... and then it's like she can... um... she can develop her **brain more** to play the scale, because, well, the **brain** develops, the **brain** is **more** prepared to be able to play that tune, because the teacher has explained **more** how...how to rehearse and how to practice and how to **study**, **she** has also realized what they have to **study** and so it's like a step towards knowing **more**), as well as their motivation to learn ((...) *also like that opportunity she gave her and...and that... that's as if the girl was the teacher and now the teacher is the girl, and the girl corrects her, because it might give her **more** strength to play and to do it better than...than... she might**

say “do this... you do this”, and perhaps *she* does it well because the teacher has been a student and *she’s* the... *she’s* the teacher).

Regarding the objectives of the lesson, these children agree that it does not make any sense to assign homework if the students do not understand the reason for it (*Because the teacher said...said **nothing** she only said what homework she had to **bring** for the next class, and that’s it*), because while studying at home, the child feels lost and lacks tools to solve learning problems (*Because when she comes, she **brings** it well, but the thing is that she does it **badly** because she **studies** it **badly** and the teacher tells her what she should do, and the next day she **brings** it better, but she **brings** better, what the teacher told her, but her finger isn’t in the right place*). As before, they do not hesitate to explain how this point should be worked on during lessons in a more positive, constructive way for the student (*Because when she **brings** it, um... she has **studied** less, but when she **brings** it and it’s done **badly**, the teacher starts doing the same thing and *she* corrects herself as if *she* were the teacher, about where she should place her fingers, because the teacher, um... is playing it like *she* did and *she* realizes that *she*... that... *she* **imagines** that *she* is the teacher so has to say how place it.*).

Finally, this group is very interested in internal listening, which did not appear in the other group, as an aid to their learning, which is more centered on the process of listening or singing than on the tuning outcome ((...) *she’s* not really looking at her hand, at what *she’s* doing, the teacher is doing it with *her*, but *she’s* **listening** to her but not exactly looking at her hand. // The girl **sang** it in her head and it helped her to play in tune. // Because the girl is going to **sing** it, to know the tuning, if you **sing** well you know the tuning for the instrument). Moreover, and unlike the other group, these students show a positive predisposition to evaluation as a joint process between teacher and student (*Because the girl*

said how it could be **studied** and the teacher also gave her a kind of opportunity to see whether she had done it well or done it **badly**), rejecting the situation of the teacher performing the evaluation without providing any explanation (*Because the teacher says... says how it is, but she **only** says what's **wrong** and doesn't say **why** she did it **wrong***).

To sum up, the analysis of how these two groups of students explain their choice and rejection of videos shows relevant differences in the way they understand learning and teaching. Table 4 summarizes the main themes in these explanations and the differences between the groups. As we can see, they are similar to those described in the Introduction between the direct and constructive conceptions of teaching/learning held by the teachers, upon which the selection of the two groups of students was based.

Table 4

Conclusions and Discussion

With regard to our first objective, testing the influence of the variables *teaching model* and *instructional level* on students' conceptions of teaching and learning, we have found that only the teaching model the students are exposed to produces significant differences in these conceptions. Children whose teachers hold constructive conceptions, which focus more on students' mental and metacognitive activity than on teacher-transmitted knowledge, also tend to hold more complex, internalized constructive representations. This confirms effects found in other studies (Pramling Samuelsson, 2006; Tikva, 2010), although in our case, in contrast to the work of Pramling (1996), the effect is more profound because children exposed to constructive teaching progress to the most complex conceptions (learning to understand),

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3 instead of only assuming intermediate levels of complexity (learning to know) but not the
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5 most internalized (learning to understand).
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9 In any event, the fact that as from at least eight or nine years of age children exposed
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11 to constructive learning absorb their teachers' conceptions, assuming greater complexity and
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13 internalization of the teaching-learning process shows that these more complex conceptions
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15 can be acquired thorough practice. Although dominant conceptions among younger children
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17 are closer to naïve behaviorism (Scheuer et al., 2006a), this may be due not only to the
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19 cognitive restrictions imposed by a certain naïve epistemological realism, as reflected by the
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21 direct conception and which has also been observed in other domains of knowledge (Hofer &
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23 Pintrich, 1997; Pozo & Gómez Crespo, 2005; Vosniadou, 2008, in press), but also to the
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25 reproductive and transmissive nature of the teaching and learning practices that they are
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27 exposed to in the specific teaching contexts, in this case instrumental music teaching. Indeed,
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29 Perry, VadeKamp, Mercer and Nordby (2002) showed that even in pre-school education,
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31 when teachers foster self-regulatory activities and view errors as learning opportunities,
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33 encouraging their students to focus on their personal progress, the children begin to use more
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35 complex cognitive processes. These authors thus showed that such young children really
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37 become involved and can perform self-regulating activities on their own learning, such as
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39 evaluating themselves or others, taking control of what happens, choosing what to learn, very
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41 much in line with the effective learners (Zimmerman, 1990): metacognition, intrinsic
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43 motivation and strategic action.
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50 Notwithstanding this effect of the teaching model on children's conceptions, our
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52 results show that these conceptions do not become more complex according to children's age
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54 and/or instructional level, in contrast to findings in prior studies, both in young children (e.g.
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56 Scheuer et al., 2006a, 2006b; 2009) and in children attending more advanced music courses
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(Bautista et al., 2012; Casas et al., submitted; Marin et al., 2012), which found more complex conceptions in older students and/or students at more advanced levels. Marín et al. (2012) partly assign the effect of instructional level in their results to the fact that learning music is more complex in higher courses and would therefore require teaching and learning conceptions that are more complex and more focused on the mental activity of students themselves. Although this may be true in the case of instrumental music, it does not necessarily seem to be so in many higher learning contexts, where teacher-centered rather than student-centered strategies and conceptions often seem to continue to prevail (Entwistle et al., 2000; Kember, 1997). In any event, since the studies that found instructional level to have an effect did not also consider the effect of type of instruction received, further studies would be needed to better understand the how these two possible variables affect student conceptions, as well as their possible interaction.

The second aim in our study was to observe the differential effect of these variables on the three phases we have identified in the instrumental music teaching/learning process – planning, supervision and evaluation of this learning. General results were similar for all phases. However, the greatest differences between students exposed to traditional and constructive teaching were found for the planning and evaluation phases. There are also differences between children regarding the supervision phase, because even though students from the traditional model mainly selected the constructive conception, they did so to a lesser extent than the other group. In contrast to these results, other authors have found that evaluation of teaching and learning is often the stage at which constructive conceptions are most easily held (Bautista et al., 2012). Similarly, Siebenaler (1997) noted that the piano teachers who children considered most effective are those who evaluate negatively, providing information about what should be corrected and what strategies should be adopted for improvement, in line with the interpretative conception. In other educational settings, such as

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3 university teaching, the least complex conceptions appeared in the planning stage (Villalón &
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5 Mateos, 2009), whereas that difference was not found in our study, perhaps because teaching
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7 to play an instrument individually tends to favor greater student involvement in the
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9 organization and design of their own learning.
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12 But beyond these minor differences among the phases of learning, we were interested,
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14 as a third aim, in analyzing more deeply the content and meaning of the conceptions held by
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16 the students. The fact that students of traditional or direct teachers held equally direct
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18 conceptions, while students of constructive teachers held the same kind of conceptions as
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20 their teachers, might be interpreted as associative or superficial learning, as a result of
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22 modeling, and thus the students tended to prefer the videos showing the kind of practice they
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24 were most familiar with. It was necessary to test the extent to which they understood the
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26 principles underlying these practices, and the extent to which they could explain their
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28 preferences to reflect that understanding. Table 4 summarizes the lexicometrical analysis of
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30 these verbalizations, showing that the students not only preferred certain practices because
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32 they were familiar with them but also that they had internalized the principles underlying
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34 those conceptions and were capable of using them to make sense of those practices. The
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36 students in the constructive group had more elaborate conceptions, including a greater
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38 number of processes, and greater complexity in those processes, in their own musical
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40 learning outcomes and in the roles of teacher and student, contrasting clearly with those of
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42 the traditional group. In fact, a comparison between Table 4 and the characterization of the
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44 conceptions (direct, interpretative and constructive) provided in the Introduction clearly
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46 shows that the verbal explanations from students of direct teachers rest on the basic
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48 assumptions of those conceptions (dominant role of the teacher, lack of student autonomy,
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50 little reference to cognitive and metacognitive processes, repetitive practice, external
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52 evaluation, extrinsic motivation, etc.), whereas students of constructive teachers refer their
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3 learning to their own cognitive and metacognitive activity (they consider the teacher as a
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5 guide rather than a transmitter of closed knowledge, believe they learn from their mistakes
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7 more than by repeating the models provided, have greater intrinsic motivation and capacity
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9 for self-regulation, etc.).
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13 It seems therefore that students have taken on a new role as learners according to the
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15 type of teaching they are exposed to. However, there are some caveats regarding these data
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17 due to the limitations of the study itself, and they should be considered for future research. In
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19 this study, the students were selected according to the conceptions that their teachers
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21 provided in answer to a questionnaire (reference omitted for masked review). Although
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23 samples of students thus selected have also shown differing conceptions of their own learning
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25 and teaching, matching those found in their teachers, there may be some doubt regarding
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27 whether these conceptions really reflect their teaching and learning practices because there is
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29 known to be some distance between what teachers say about their practices and what in fact
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31 they do in their classrooms, both in music (Torrado & Pozo, 2006) and in other domains
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33 (Atkinson & Claxton, 2000; Olafson & Schraw, 2006). Studies on smaller samples would be
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35 needed in order to analyze the relationship between observed teaching practice and student
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37 conceptions (reference omitted for masked review).
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43 Along the same line, by having students select and reject videos showing teaching and
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45 learning practices, we have been able to ascertain which practices the students themselves
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47 prefer and reject and the explanations for their choices. Nevertheless, it would be important to
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49 find out how these conceptions guide the students' own learning practices when confronted
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51 by a real learning demand. We know that students of direct and constructive teachers
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53 conceive of learning and teaching differently, but it would be a good idea to test whether
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based on these different conceptions they do in fact learn in different ways by using different learning strategies.

Lastly, we believe that this study could also open up a further line of research on the specificity or generality of student learning/teaching conceptions. Since learners who are studying music are at the same time learning in many other formal and informal domains, it is worth enquiring whether their conceptions are limited to the musical domain or generalized in other domains in which they are also learning (writing, mathematics, drawing), where they might be exposed to different teaching practices, according to the conceptions held by their teachers in each subject. Based on the models of conceptual change, it may be assumed that change in these learning conceptions might be related to the student's skill in that domain, which would shed new light on the specificity of students' conceptions regarding knowledge and its acquisition.

We believe that in addition to our research objectives, another relevant contribution of this study is the development and creation of the materials used, i.e. the nine videos showing choices representing student and teacher conceptions of teaching and learning in individual music lessons. In view of the results obtained after using these videos, we believe that they could be very useful not only as a tool to gain access to student conceptions but also as a starting point for reflection on the conceptions regarding learning and teaching held by currently active teachers and those attending teacher training courses.

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Appendix 1

VIDEO SCRIPTS - LESSON PLANNING	
DIRECT CONCEPTION	<p>(The student plays the end of C Major scale in tune.)</p> <p>T: <i>Very good Blanca. So, for next week, study the C Major scale well, and remember that we're going to play these two scales in the exam in two weeks, so study it properly and focus on the tuning, ok Blanca?</i></p> <p>S: <i>Ok!</i></p>
INTERPRETATIVE CONCEPTION	<p>(The student plays the end of C Major scale in tune).</p> <p>T: <i>Good, good, Blanca, it seems you have finally realized how you have to place your hand. So, for next lesson, study C Major well. Remember to put your hand in the correct place to play it in tune, ok?</i></p> <p>S: <i>Yes.</i></p> <p>T: <i>Remember also that you have to play these two scales for the exam in two weeks, so be careful when you place your hand, so that you can play in tune. Ok Blanca?</i></p> <p>S: <i>Ok!</i></p>
CONSTRUCTIVE CONCEPTION	<p>(The student plays the end of C Major scale in tune.)</p> <p>T: <i>How is going, Blanca?</i></p> <p>S: <i>Well, it's not good enough yet... my hand is still moving a little (on the</i></p>

	<p>fingerboard).</p> <p>T: <i>Yes, and can you think of anything else to improve it and control your hand?</i></p> <p>S: <i>Singing it in tune, imagining it in my mind and listening to it while I play.</i></p> <p>T: <i>I think those are great ideas, so with all we have been working on today, what are you going to study next week?</i></p> <p>S: <i>To control my hand while I'm listening to it.</i></p> <p>T: <i>Very well, and because we have to prepare the concert of scales, we could study C Major, because it also has the same things we practiced today, do you agree?</i></p> <p>S: <i>Sure.</i></p>
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Appendix 2

VIDEO SCRIPTS – LESSON SUPERVISION	
DIRECT CONCEPTION	<p>(The student starts playing C Major, and plays the A out of tune. The teacher stops her immediately.)</p> <p>T: <i>Blanca, it's still a little out of tune, ok? Let's play it together to make sure it's all right, let's start.</i></p> <p>(They play together, and the student focuses on the teacher's hand movements, to imitate them. They both play it correctly, while the teacher gives the following instructions):</p> <p>T: <i>And now, when playing the G-string, put the same distance between D and A, don't open your fingers, that's it!</i></p> <p>T: <i>Well, now it's alright, so play it once more from the beginning, please, to make sure it goes ok, and remember when changing fingers between strings to play in tune.</i></p> <p>S: (nods)</p> <p>(The student plays the scale in tune, looking at her hand).</p> <p>T: <i>Very good!</i></p>
INTERPRETATIVE CONCEPTION	<p>(While the student is playing C Major):</p> <p>T: <i>Now I'm going to use my hand on your fingerboard, so that you can imagine a kind of "stop" that you should not go beyond when you play A.</i></p> <p>T: <i>Can you feel it? (Singing: "G-A" and giving instructions while the student is playing): Relax your shoulder, you're very tense. Good, much better. Now you've realized that you must keep your hand in the same place all the time, so play it yourself alone once more, and focus on tuning, please.</i></p> <p>(The student plays the scale well).</p> <p>T: <i>Very good, Blanca. Now you know that keeping the hand in the same position all the time means playing correctly in tune.</i></p>

CONSTRUCTIVE CONCEPTION	<p>T: <i>Well Blanca, with all the things we have been working on during the lesson, what are you going to remember before playing the scale once more?</i></p> <p>S: <i>I'm going to remember the feelings I had when I was pretending to be your teacher: so that you were my student, to put my finger in the correct place (showing it with the hand) and to know what the proper tuning is.</i></p> <p>T: <i>Right, let's try it!</i></p> <p>(The student plays the scale in tune with a slower <i>tempo</i>).</p> <p>T: <i>Right, what did you do to play it better?</i></p> <p>S: <i>I've been listening to it internally, at the same time as I was playing.</i></p> <p>T: <i>Right, but now it is too slow, isn't it? What could we do?</i></p> <p>S: <i>Yes, I'm going to try during next week to get to play it faster.</i></p> <p>T: <i>Good!</i></p>
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Appendix 3

VIDEO SCRIPTS - LESSON EVALUATION	
DIRECT CONCEPTION	<p>(The teacher reads the student's homework in her diary.)</p> <p>T: <i>Well, today you might play C Major... please Blanca, play it for me.</i></p> <p>(The student plays the scale, the teacher stops her immediately when she plays A out of tune):</p> <p>S: <i>Well, A is a little bit out of tune. Could you start again?</i></p> <p>(The student starts again, and makes the same mistake, the teacher stops her again):</p> <p>T: <i>That's out of tune, it's still a little too flat. Please, watch how I play it, ok?</i></p> <p>(The teacher plays the scale perfectly in tune, exaggerating the gestures of the hand when playing A, the student pays attention).</p> <p>S: <i>Did you pay attention to where I put my hand? Ok, so now play it alone, please.</i></p> <p>(The student plays the scale looking at her hand, while the teacher stands up and corrects the student's fingers so that she plays in tune).</p>
INTERPRETATIVE CONCEPTION	<p>(The teacher reads the student's homework in her diary.)</p> <p>T: <i>Well, today you might play C Major... play it for me, please.</i></p> <p>(The student plays the scale, but the teacher stops her to explain why A was out of tune):</p> <p>T: <i>Remember your hand; you're not paying enough attention to it... Once again, please.</i></p> <p>(The student plays it again wrongly. The teacher stops her again).</p>

	<p>T: <i>Uhhh, your hand is going up too much. That's happening because you're not focusing on it. Please, watch how I play it, and observe carefully, alright?</i></p> <p>(The teacher starts to play it for the student, while explaining what she is doing):</p> <p>T: <i>Once you play D and E in their places and they're in tune, as you already do, the only thing you have to take care of is to put A at the same height, not higher up or further down. If you put it in the same place, it should be perfect, right?</i></p> <p>S: (nods).</p> <p>T: <i>Well, now I think you've realized how it should be done.</i></p>
CONSTRUCTIVE CONCEPTION	<p>T: <i>Well, how did it go? Are things going a little better?</i></p> <p>S: <i>Now I control my hand much better</i> (plays the scale slowly).</p> <p>T: <i>Ok, what do you think? Have you improved?</i></p> <p>S: <i>I still don't focus too well and it's a little out of tune, but it's getting better and better.</i></p> <p>T: <i>And what else could we do to improve it...? Perhaps we could imagine now that you are my teacher, and let's see what you can think of to help me to play in tune, do you agree?</i></p> <p>S: <i>Yes.</i></p> <p>(The teacher plays the scale while the student puts her finger in the correct place and says):</p> <p>S: <i>Imagine A in your head.</i> (Meaning to sing it internally.)</p>



Figure 1. Direct conception of instrument teaching and learning
826x653mm (72 x 72 DPI)

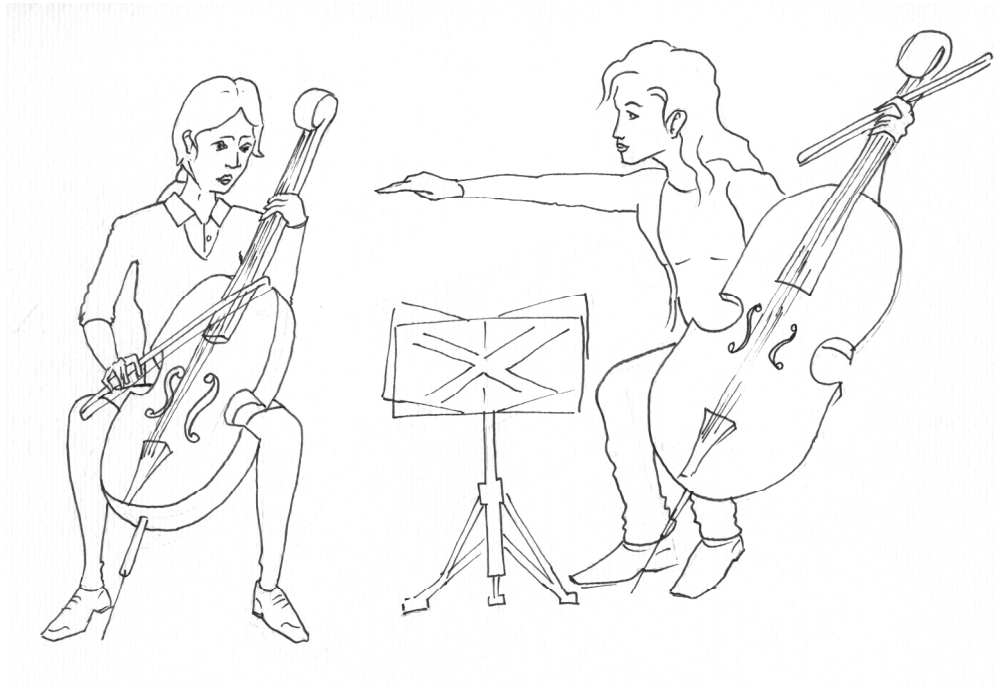


Figure 2. Interpretative conception of instrument teaching and learning
1075x734mm (72 x 72 DPI)



Figure 3. Constructive conception of instrument teaching and learning
1083x815mm (72 x 72 DPI)

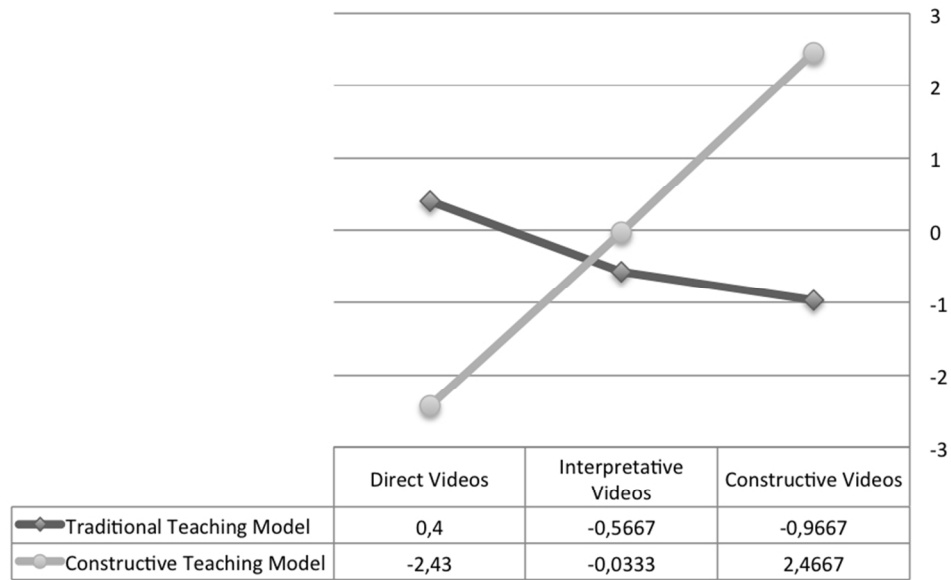


Figure 4 - ANOVA means for video preference, according to teaching model
160x97mm (150 x 150 DPI)

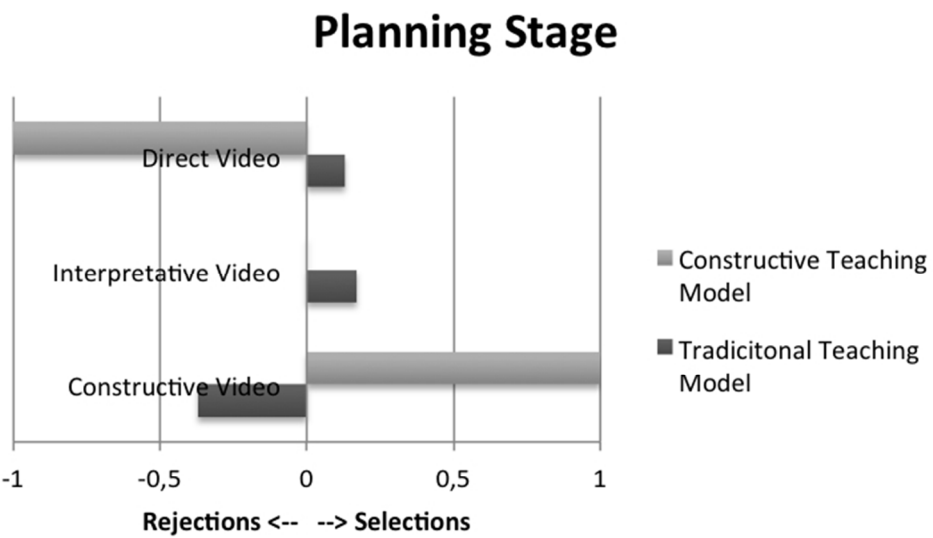


Figure 5 - Means of the videos for the Planning Stage, according to teaching model and student preference
127x77mm (150 x 150 DPI)

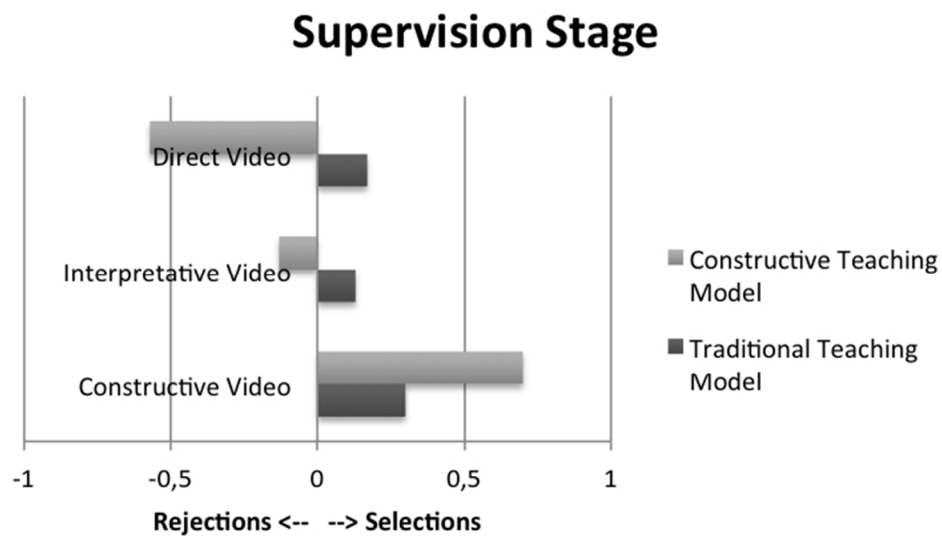


Figure 6 - Means of the videos for the Supervision Stage, according to teaching model and student preference
127x77mm (150 x 150 DPI)

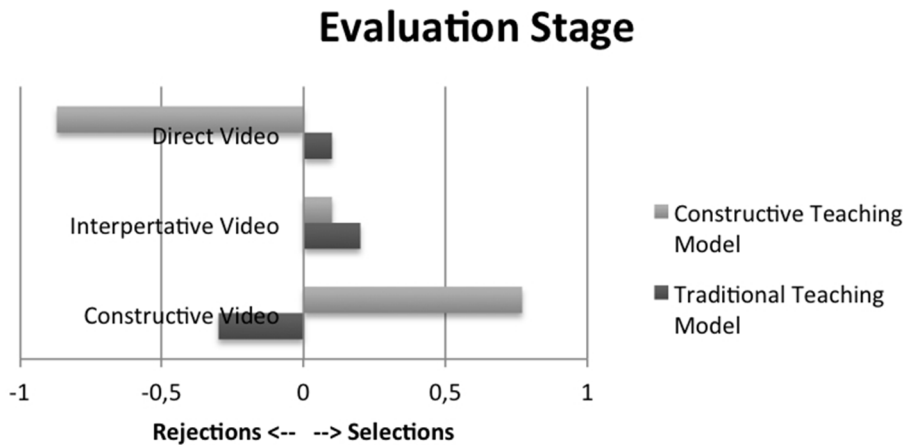


Figure 7 - Means of the videos for the Evaluation Stage, according to teaching model and student preference
138x71mm (150 x 150 DPI)

NUMERO	VALEUR PROPRE	POURCENTAGE	POURCENTAGE CUMULE	
1	0.1381	5.66	5.66	*****
2	0.1248	5.12	10.78	*****
3	0.1190	4.88	15.66	*****
4	0.1145	4.69	20.36	*****

Figure 8 – Histogram of the four first FCA values
122x16mm (200 x 200 DPI)

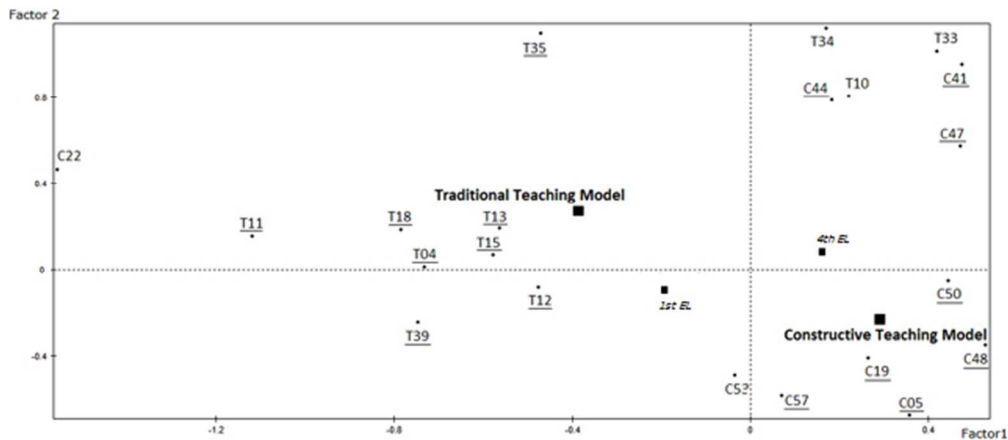


Figure 9 - CFA of the lexical non-aggregated table with the contributive participants and text modalities of Axis 1 & 2. Letter T represents the tradicional teaching model participants, and letter C the constructive teaching model participants
225x99mm (72 x 72 DPI)

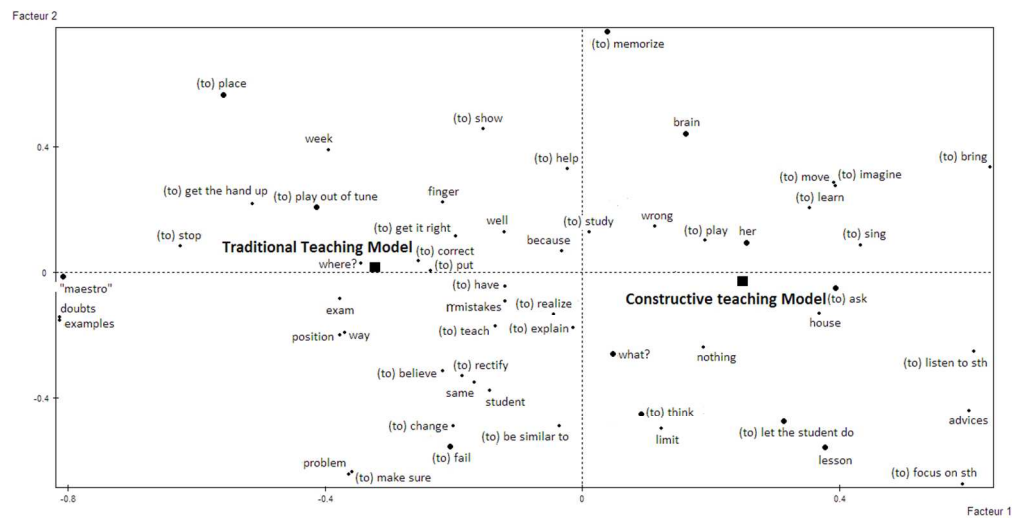


Figure 10 - CFA of the lexical aggregate table with the contributive words and text modalities of Axis 1 & 2. Original Spanish have been translated into English, and verbs have been changed into the infinitive form 436x220mm (72 x 72 DPI)

INSTRUCTIONAL LEVEL	TEACHING MODEL	TOTAL
1st Elementary Level	Traditional	15
	Constructive	15
4th Elementary Level	Traditional	15
	Constructive	15

Table 1. Number of participants per instructional level and teaching model

GROUP	STUDENT PREFERENCES		
	Direct Video	Interpretative Video	Constructive Video
Traditional TM 1st E.L.	S= 24 (53.4%) R= 10 (22.2%)	S= 14 (31.1%) R= 7 (15.5%)	S= 7 (15.5%) R= 28 (62.3%)
Traditional TM 4th E.L.	S= 18 (40%) R= 18 (40%)	S= 16 (35.5%) R= 8 (17.8%)	S= 11 (24.4%) R= 19 (42.2%)
Constructive TM 1st E.L.	S= 3 (6.7%) R= 39 (86.7%)	S= 5 (11.1%) R= 5 (11.1%)	S= 37 (82.2%) R= 1 (2.2%)
Constructive TM 4th E.L.	S= 2 (4.4%) R= 39 (86.7%)	S= 4 (8.9%) R= 5 (11.1%)	S= 39 (86.7%) R= 1 (2.2%)
TOTAL TRADITIONAL	S= 42 (46.7%) R= 28 (31.1%)	S= 30 (33.3%) R= 15 (16.7%)	S= 18 (20%) R= 47 (52.2%)
TOTAL CONSTRUCTIVE	S= 5 (5.56%) R= 78 (86.7%)	S= 9 (10%) R= 10 (11.1%)	S= 76 (84.4%) R= 2 (2.2%)

Table 2. Number and proportion of selections (S) and rejections (R) in each group for the videos for each conception, organized according to instructional level and teaching model (TM).

Test-Values of the illustrative modalities					
Label	Participants	Absolute weight	Distance to the origin	Axis 1	Axis 2
Teaching Model					
Traditional TM	30	1887.00	1.59020	-2.88	2.27
Constructive TM	30	2457.00	1.04772	2.21	-1.74
Instructional Level					
1st EL	30	1997.00	1.44970	-1.52	-0.79
4th EL	30	2347.00	1.18822	1.30	0.67

Table 3.- . Modalities of the active variable *Teaching Model* and the illustrative variable *Instructional Level*. Test values $\geq \pm 1.96$ appear underlined

	Traditional Group	Constructive Group
Role of the Teacher	<ul style="list-style-type: none"> -Greater hierarchy “maestro” -Orders -Explains -Corrects errors 	<ul style="list-style-type: none"> -Guides -Helps -Asks what and how to do things -Uses errors as a tool for learning
Role of the Student	<ul style="list-style-type: none"> -Not autonomous -Asks what to do -Obeys orders 	<ul style="list-style-type: none"> -Autonomous -Reflects on how to do things -Thinks
T&L Processes	<ul style="list-style-type: none"> -Teacher-centered evaluation -Repetitive practice -Extrinsic motivation -Modeling 	<ul style="list-style-type: none"> -Joint evaluation -Reflective practice -Intrinsic motivation -Internal listening -Management of attention/concentration -Recovery and transfer
T&L Results	<ul style="list-style-type: none"> -Quantity of practice -Psychomotor (position of fingers and hands) to play in tune -Perfect exam -Exact production of symbolic material 	<ul style="list-style-type: none"> -Quality of practice -Internal listening to play in tune -Learning to study -Understanding why things are done

Table 4. Summary of differences in verbal explanations of choices and rejections by the two groups of students.

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BIOGRAPHICAL NOTES

Guadalupe López-Íñiguez is a PhD candidate in the Department of Cognitive Psychology at Autonomous University of Madrid, Spain. Her educational background comprises two different majors: cognitive/educational psychology and music performance (baroque, classical and modern cello). She is currently finishing the writing of her thesis, which is focused on the analysis of teachers’ and students’ conceptions of teaching, learning, and evaluation within the field of music performance, as well as the analysis of constructivist approaches to string playing.

Dr. Juan-Ignacio Pozo is Professor at the Faculty of Psychology of Autonomous University of Madrid, Spain, where he teaches topics related to psychology of learning. His research focuses on the processes of knowledge acquisition in different subject domains, such as science, history, geography, and also music. He has studied how to change teachers and learners conceptions of learning as a requirement transforming education, publishing several books and papers about learning and teaching in those domains.