# Analysis of constructive practice in instrumental music education: Case study with an expert cello teacher

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## Abstract

A case study was conducted on an expert cello teacher and a 7-year-old student, to analyze the relationships between the teacher's constructive conceptions and instructional practices, by means of the *System for Analyzing the Practice of Instrumental Lessons*. This article describes a constructive teaching model based on: (a) the student's learning processes, (b) fostering conditions that enable learning and (c) achieving long-lasting learning outcomes which are student-driven and applicable to other situations. Results suggest that many of this teacher's practices reflect the constructive profile to which her conceptions are associated.

**Keywords:** case studies; constructivism; discourse analysis; instrumental music education; teaching and learning practices; teacher-student interaction

## 1.1. Introduction

Research on instruction and teaching strategies over the past 20 years has shown two paradoxical results. Firstly, we have learnt that in order to achieve meaningful, relevant learning in different educational contexts, teaching strategies must be student-

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centered, such that students will truly be the "engine of learning"– active agents who construct their own knowledge (Bruner, 1996), and in the context of this article, appreciate music through musical understanding (Wiggins, 2007, 2015), e.g. through scaffolding activities promoting metacognition and self-regulation. Teaching practices should include complex dialogical and cooperative learning strategies that consider student knowledge and capabilities. Excellent teaching which enhances student learning makes schooling effective and improves teacher education and evaluation (Betoret & Artiga, 2004; Skamp & Mueller, 2001) would respond to the assumptions of the constructivist approach, acknowledged by educational psychology researchers.

Secondly, although there is theoretical and empirical consensus on the advantages of constructivist teaching, several studies show that in many educational contexts, teaching practices are still more like a "system of delivery" (in the words of Robinson, 2013) based essentially on direct transmission of knowledge to students. In fact, even if teachers would prefer to adopt more student-centered practices, they indeed recognize that they mostly use teaching strategies focusing on such transmission of knowledge (De Aldama & Pozo, in press; OECD, 2009, 2013). This shows that relationships between conceptions and practices are more complex than some studies supposed, as it may be assumed that in most contexts they influence one another (Buehl & Beck, 2015). Identifying the types of practice (activities, strategies, etc.) that characterize constructive teaching may help to extend its use among teachers.

This paper looks at instrumental music teaching, a field in which there is also a gap between theory and practice. In the music classroom it seems that even though teachers are aware of the theoretical assumptions underlying constructivist models, very often they are unable to put them into practice successfully (e.g. Gaunt, 2008; Pratt, 1992). Relevant research could contribute to bridging this gap. One research topic would be thoroughly analyzing real constructive learning situations that could serve as examples for in-service and pre-service instrumental music teachers. Another would be analyzing models of constructivist and complex teaching practices as sources for reflective teaching. Herein we describe the general features of a complex, student-centered practice in instrumental music teaching-learning situations through a case study of an experienced cello teacher who holds a constructive conception and a 7-year-old beginner student, during four consecutive one-to-one lessons. Our aim is to

determine whether this teacher's practices are consistent with the complexity expected from a constructive teacher of a musical instrument in comparison to more traditional or teacher-centered practices.

## 1.2. The difficulty of changing teaching conceptions and practices in the music classroom

The gap between educational theory and classroom practices was revealed not only in the latest Teaching and Learning International Surveys (OECD, 2009, 2013), but also in many other studies. For instance, Liu (2011) found that 79% of 1340 elementary school teachers of technology held constructivist beliefs but used traditional practices. Lim and Chai (2008) found similar results for computer-mediated lessons in English, mathematics and science. De Aldama & Pozo (in press) asked teachers about possible use of information and communications technology (ICT) in the classroom, and found that their answers displayed more constructive beliefs than did their descriptions of how they actually used ICT in classroom activities. To sum up, Fives and Buehl (2012, p. 481) claimed with regard to the relationship between conceptions and practices that "for every study that offers evidence to support the relation an equal number suggest that beliefs are not consistent with practices". Buehl & Beck (2015, p. 71) conclude after a thorough review of 257 studies on the relationship between conceptions (or beliefs) and practices: "there was never a perfect correspondence between beliefs and practices, nor a complete lack of relationship".

In the field of music there has also been much research on the different conceptions of teaching and learning held by teachers and students (e.g., Bautista et al., 2010; López-Íñiguez, Pozo, & de Dios, 2014; Marín, Scheuer, & Pérez Echeverría, 2013). Detailed analyses of the types and evolution of these conceptions show that they range from more traditional or transmissive and teacher-centered to more constructive and student-centered (see Fives, Lacatena, & Gerard, 2015; Hofer & Pintrich, 2002), which would affect the ways in which students construct knowledge, experience learning and make conceptual connections to learning contents rather than to learning processes (*sensu* Wiggins, 2015; Wiggins & Wiggins, 1997).

This paper focuses on the main features of the constructive conception held by teachers and learners regarding teaching and learning. These features are organized according to certain psychological assumptions. Following studies on conceptual change that identify some basic epistemological (Vosniadou, Vamvakoussi, & Skopeliti, 2008) and ontological principles (e.g. Chi, 1992) that underlie students' and teachers' ideas in different domains, we assume that a constructive approach to learning and teaching requires a change in three main principles. Certain *epistemological assumptions* need to be accepted such that knowledge would be a construction developed by the subject, who constructs own and personal models to interpret reality (which may be more or less appropriate). According to *ontological assumptions*, learning could be conceived in terms of complex systems (e.g. self-regulation processes), internally managed by the learner in order to build and develop abilities or strategies. Finally, according to *conceptual assumptions*, there would be a complex, interactive relationship among learning conditions, learning processes and learning outcomes (Pozo et al., 2006).

Also, following learner-centered instructional approaches showing that learning and teaching must be oriented to reconstruct students' conceptions, attitudes and strategies within a constructivist framework (e.g., Bransford, Brown, & Cocking, 2000; Sawyer, 2006), if we want to promote more student-centered instruction, teacher training strategies should be designed to promote more constructive conceptions or beliefs in teachers. In recent years, there has been increasing interest in studying teachers' and students' ideas about how teaching and learning take place. It is believed that these ideas may influence (1) teachers' classroom practices (Hermans, et al, 2008; Tikva, 2010) as a result of learning experiences in different social contexts (Olson & Bruner, 1996), (2) students' conceptions and focus on learning (López-Íñiguez & Pozo, 2014a, 2014b; Pramling, 1996; Tikva, 2010) and (3) students' commitment to lessons (Schroeder, et al, 2011). Although various case studies describe the general features of teaching in the field of instrumental music, we have not found any case studies describing teachers' practices in depth according to their conceptions of teaching and learning.

The closest empirical studies on music related to this topic are Pratt (1992), who looked at the relationships between perception and practice in 20 teachers during individual instrument lessons and singing lessons, and Gaunt (2008), who analyzed the

perceptions of 20 teachers at a conservatoire regarding aims, context and processes in individual instrument lessons. Both these studies found that although teachers stated that they were very interested in teaching their students autonomy and self-confidence, their practice showed transmissive, non-student-centered teaching. Gaunt suggested that this may be partly explained by the professional isolation in which instrument teachers often find themselves at educational centers. Similarly, Mills and Smith (2003) assessed 134 instrument teachers whose aims were that students should have fun, participate and make progress during the lessons, whereas their students' perceptions were entirely different. The same was observed by Rife, Schnek, Lauby and Lapidus (2001) in their study on children's satisfaction with private instrument lessons.

The abovementioned studies are general and looked at superficial (albeit important) features of instrument lessons. However, we are specifically interested in describing teaching-learning practices which are either student- and process-centered (constructive) or teacher- and content-centered (traditional or transmissive). The following section describes more replicative, teacher-centered classroom practices which are farthest from the assumptions of the constructive conception and from approaching the student's world in a "friendly" manner.

## 1.3. Studies on effective (and not so effective) teaching practices in music classrooms

Various studies have analyzed teacher-student relationships in the music classroom from a wide range of standpoints. Most of them focused mainly on individual lessons. Several studies have reported that the teacher speaks unidirectionally to the class about half the time (e.g. Kotska, 1984; Tait, 1992). Rostvall and West (2003) found that teachers sometimes even make sarcastic remarks or mock students if they speak up. Their study on 4 teachers and 21 students of different ages and levels of guitar and brass instruments reported there was no dialogic interaction at all and one of the most frequently repeated phrases was, "Play it again from here". When these teachers asked a question during a lesson, they answered it themselves and gave no opportunity to the students. They used the same teaching method for all students regardless of individual differences, their actions were routine and focused on the notational, and they penalized student error.

Similarly, in a case study on a teacher at a conservatoire, Persson (1996) found that students did not participate in class because they were overawed by the teacher and felt that there was too much emphasis on technique and error-free perfection. The teacher was dominating, leaving no room for students to express themselves or reflect, and filling the lesson with orders, advice and suggestions focusing on faithful reproduction of the score. It was also noted that this teacher preferred to tell students what to do and show them how by means of gestures. Similarly, Karlsson and Juslin (2008) recorded lessons of 5 music teachers with 12 students and then applied transcription, content analysis and encoding in feedback categories and language use. They found that the teachers' main goals focused on technique and playing the score. The teachers talked most of the time and subjects such as emotion or expression were only dealt with marginally or even implicitly.

This one-way conveyance of knowledge has been reported by many authors, who note that a significant number of teachers are dominating and their students are subordinate, with clear imbalance between their hierarchies. They suggest that a change to student-centered teaching would be highly favorable because it would involve greater enjoyment, interest, progress, motivation and positive attitude to learning (Durrant, 2003; Jørgensen, 2001; Mackworth-Young, 1990). Yarbrough and Price (1989) observed similar patterns in a study on 79 teachers of instrumental and vocal music education, where students basically responded to the teachers' demands by playing the instrument – not talking; the teacher gave orders and hardly ever asked questions, stopped the students immediately whenever a mistake was made, and activated student's attention by assigning tasks and positive/negative corrections of their performance.

Even if these studies acknowledged an imbalance between the role of teacher and student, there also seem to be nuances regarding lesson timing and organization according to different levels of teaching expertise. Thus, there is evidence showing that teacher-student interaction episodes tend to be shorter in lessons with expert teachers than with novice teachers (Buckner, 1997; Goolsby, 1997; Siebenaler, 1997); children studying with expert teachers seem to talk more, and teachers undergoing training model more (Henninger, Flowers, & Council, 2006); and student teachers spend more

time on each individual learning activity than do experienced teachers (Moore & Bonney (1987).

In the light of such research, many pedagogues of musical instruments appear to accept the transmissive teaching model. Siebenaler (1997) studied five piano pedagogues who watched 78 piano lessons with adults and children and then evaluated the teaching practices. The pedagogues considered that the most effective lessons were those in which the student played less and the teacher played much more; they judged the best teachers to be those who most frequently disapproved of students' actions and results, and mainly used modeling, gave brief orders and demanded correct interpretation. Along the same lines, Duke and Henninger (2002) studied 51 external observers who watched the practice of one teacher with 50 different students. The observers judged it positive when the teacher corrected students' errors immediately, with the two most frequently repeated orders being to play a passage again or to change something in the passage. Moreover, teachers who provide continuous feedback – whether positive or negative – on students' skills seem to be judged as the best by expert observers (Buckner, 1997; Carpenter, 1988; Duke, 2000; Siebenaler, 1997; Speer, 1994; Yarbrough & Price, 1989).

The studies described above show traditional transmissive patterns of learning, but very few report "effective practice" ("effective" in the sense of achieving aims rather than in the sense of playing well) more in line with the ideas supported by the constructivist theoretical model. The article by Cheng and Durrant (2007) is one of the exceptions. It reported holistic violin practices in which, although there were some transmissive features, the teachers focused mainly on the students' learning processes and not exclusively on the contents being learned. One of the students participating in Cheng and Durrant's study initiated the discourse and learning activities most of the time during individual lessons, even though Thompson (1984) previously considered that this was not possible. We believe, in line with Perry and Vandekamp (2000), that these studies do not represent teachers who help their students to learn complex tasks by self-regulating, even though the approach to learning is more "friendly". In this regard, according to the idea of "cold and warm" learning support proposed by De Sixte and Sánchez (2012), the above "effective" study would partly describe warm support from teachers who give their students closed tasks. (Cold support would be, for example,

decoding symbols and understanding a score structurally and musically, while warm support would be related to motivational, emotional and cognitive processes).

Our study looks more in-depth at the most outstanding features of constructive teaching practices in the music classroom by using a comprehensive system for analysis. We have followed Meyer and Turner's claim (2002) that practice has great capacity to inform theory, both through discourse analysis and by studying teacher-student interaction, in particular with teachers who support learners during the lessons, adjust the level of difficulty to the student's capabilities as in the zone of proximal development (Vygotsky, 1930-1934/1978) and perform scaffolding activities with them (Bruner, 1966).

**2.1. Method**

*2.1.1. The System for Analyzing the Practice of Instrumental Lessons*

We developed the System for Analyzing the Practice of Instrumental Lessons (hereinafter SAPIL) in collaboration with the Research Team on Acquisition of Musical Knowledge (GIACM, 2011). This system relates classroom episodes (analysis units) to what and how teaching and learning take place (dimensions) during music lessons. In addition to specific content, music lessons involve distinctive features in comparison to other subjects: observable actions are easier to record and monitor, and learner-teacher interaction is often one-to-one. Given these specific conditions, the SAPIL provides a deductive system for analyzing music learning and teaching practices.

The SAPIL contains categories for each musical practice or activity and indicates which practices correspond to each approach on the continuum described in the Introduction, i.e., ranging from highly transmissive or traditional teaching practices to more constructive practices focusing on student learning and driving progressive change in music classrooms. It assumes that a transmissive teacher would not consider the student's learning process as much as a constructive teacher would. Transmissive teaching is more monological, whereas constructive teaching favors dialogical interaction. The SAPIL distinguishes among different types of practices. It includes specific criteria to define (1) units of analysis (related to subject, e.g. musical pieces or

exercises, and related to time, e.g. the moment in the lesson) and (2) typical classroom activities (i.e. the various parts into which time in a lesson is structured). It also includes specific criteria for the dimensions that should be observed. These criteria are summed up in three main questions (Pozo, 2008):

- What is learned or what learning is intended? (learning outcomes).
- What processes and activities will enable the student achieve those outcomes, how is musical learning managed cognitively, emotionally and metacognitively and why? (learning processes).
- How are the activities or practices organized, i.e. what type of teacher-student interaction and what materials are used in the lessons? (learning conditions).

The SAPIL was adapted to string instruments for this specific study, and in view of its length, we encourage the reader to read the full description in Appendix A.

*2.1.2. Design*

This is a descriptive, simple cross-sectional, illustrative case study (León & Montero, 2002). We used the SAPIL, obtaining high Fleiss's Kappa inter-rater agreement (> .80). We used the software ATLAS.ti version 7 for qualitative data analysis by deductive encoding of teacher and student verbal and musical-instrumental production. In addition to analyzing text, this software version analyses video and audio, enabling identification of the temporality of some codes, frequency of use of each code and relationships among them, as well as providing the possibility of comparing the videos to other primary documents. This paper uses the information gathered from the multiple choice questionnaire completed by the teacher, practice and study diaries, post-lesson interviews with the teacher and interviews with the child to illustrate how the analysis relates to motivational and planning aspects of this teacher's lessons, and to her student's conceptions of teaching and learning. All the data collected, whether in writing or from participants' discourse through transcriptions of the lessons, were translated from Finnish into English, to enable the first author to analyze them.

*2.1.3. Participants, procedure and tasks*

In order to find a teacher who holds a constructive conception of teaching and learning and who displays "effective" practice during her lessons, we used the multiple-choice questionnaire for piano teachers, which included items on teaching, learning and evaluation (López-Íñiguez et al., 2014). Thirteen teachers of string instruments at elementary levels at a school of music in Helsinki answered the questionnaire. For each teacher, at least 8 lessons were observed and field notes were taken over 3 months during the first author's initial research stay.

After reviewing the recordings of all these lessons, the researcher's field notes and the answers to the multiple choice questionnaires from all these teachers, we decided to analyze the practices of the teacher whose profile was determined to be the most constructive. The selected teacher has about 30 years' teaching experience at Finnish schools of music. She was trained in different courses in pedagogy and didactics for teachers of music, and holds post-graduate and master's degrees in teaching cello. She is active and confident in dealing with curricular matters with students' parents.

At the beginning of the second research stay we interviewed all the students at elementary level who were studying with this teacher (ages 7 to 12 years) using the structured interview on conceptions of learning and teaching string instruments published by López-Íñiguez & Pozo (2014a, 2014b), which includes tasks for learning music scores at different processing levels, and watching videos of typical instrument learning situations. The children were interviewed with the help of a simultaneous translator who mediated between the first author and the students, so that the interview was conducted in their mother tongue, Finnish. All the materials for the interview were translated into Finnish prior to the interview. Parental authorization was obtained, and parents were assured that children's personal data would be treated with absolute confidentiality.

The children's answers in the interviews showed a constructive tendency similar to their teacher's, so it was agreed with the teacher that 4 individual lessons would be recorded (about 30 minutes in duration each) over 4 consecutive weeks with several of the students. The first author was present at these lessons, taking notes and using the

video camera. The teacher was also asked to complete practice diaries to record the learning aims for each lesson, emotional and motivational issues, and planning items before and after each lesson. During a third research stay, three 2-3-hour sessions of post-lesson interviews with the teacher were audio-recorded in order to clarify the researchers' questions regarding times when verbal or gestural information was insufficient to establish what SAPIL codes the teacher was using or exactly what her aim was upon using certain teaching/learning strategies. In addition, a study diary was prepared for students to record their motivation and achievement before and after each home study session, and the learning aims and planning for their studies.

Out of all the recordings and materials collected, in this specific study we will focus on and analyze the lessons of this teacher with one 7-year-old student. This student comes from a middle-class Finnish nuclear family with higher education, and has normal scholastic performance. She was at the beginning stage of learning with this teacher and had studied cello only with this teacher.

## 3.1. Results

In this section, we firstly describe the general features of all lessons, focusing specifically on their subject (type of episode). We illustrate the frequencies related to participants' verbal production, time spent resting and playing, and number of interventions by teacher and student in total musical production. We also analyze inactive production time, i.e. time which cannot be encoded according to the SAPIL because it contains non-observable features that could be analyzed *a priori* (e.g. time spent thinking). In addition, we analyze the frequency of occurrence of the codes included in the learning outcomes, processes and conditions from the SAPIL in the discourse of both teacher and student, describing how they were used in each lesson, and calculating the total number of codes used over the four lessons. This description helps define the teacher's practices in the Discussion section.

### 3.1.1. Global description of the four lessons

Table 1 shows that all lessons were used for the student's *musical production*, with the student *playing* for longer and ten times more often than the teacher, who only

made a few interventions or none, depending on the lesson. *Verbal production* involved student and teacher speaking for 14% and 22% of the lesson time, respectively. The teacher *spoke* 5 to 11 percent longer than the student.

Distribution of coded time for *active* and *inactivity* was similar in all lessons. *Digressions* and *rests* enabled the student to relax with regard to *psychomotricity* and structured the lessons into different episodes (see Appendix B), with the student starting all the *digressions* but one – which were very long – and the teacher starting 8 out of 10 *rests* – which were shorter. *Rests*, usually for relaxing the student's hands or changing posture if the body was tense, were mostly managed by the teacher. The opposite was true of *digressions*, where the student suddenly started talking about subjects completely unrelated to the lessons with statements such as: "*Miss, do you know what happened to me today in the math lesson?*" or "*It's my grandmother's birthday today.*". *Inactive* time included student's and teacher's silent thinking, touching their hair, holding their heads in their hands, or engaging in neutral activity that was not otherwise accounted for in the SAPIL instrument. This *inactive* time deserves special mention because it took up almost one third of the lesson time.

**Table 1.** Percentages of active and inactive production during the four lessons

|  | Average per lesson | Detail |
|---|:---:|---:|
| **Teacher's verbal production** | 22.00% | Word amount average: 1,219 |
|  |  | Average time: 06:33 |
| **Student's verbal production** | 14.25% | Word amount average: 620 |
|  |  | Average time: 04:15 |
| **Teacher's musical production** | 2.25% | Average time: 00:40 |
| **Student's musical production** | 28.25% | Average time: 08:25 |
| **Digressions and rests** | 13.00% | Average time: 03:52 |
| **Inactivity** | 20.25% | Average time: 06:02 |
| **Duration of the lesson** | 29:48 | Total time 1st lesson: 27:52 |
|  |  | Total time 2nd lesson: 28:34 |
|  |  | Total time 3rd lesson: 31:53 |
|  |  | Total time 4th lesson: 30:54 |

All the types of *musical units* were worked on during the four lessons: *technical exercise* 1 time; *musical piece* 32 times; *creation* 2 times; *others* 8 times. Table 2 shows

that *tuning* was used in all lessons – three times jointly and once by the teacher alone. The teacher did not usually interrupt the student while she was *playing* or *speaking*. The student spent more time *playing* than *speaking*, and the teacher played very little and spoke more often. Considering all of this in connection to the explanations in the sections below clearly shows that the activities – whether *speaking* or, to an even greater extent, *playing* – were student-centered. There was no external correction and the student's activity was respected. Indeed, the lesson planning and aims section in the teacher's practice diaries referred to the student's *musical production* and not interrupting her while she played as follows:

> *It is important for the student to become familiar with the instrument: playing in different positions, for as long as possible during the lesson, because we do not know whether she will study at home. In addition, she should not be blocked by small things; everything should make musical sense even if it is out of tune; the concept of a piece cannot be worked on by playing it bar by bar.*

**Table 2.** Frequency of appearance of the codes included in 'typical classroom activities' in the SAPIL

| Code | Teacher | Student | Total |
|---|---|---|---|
| Tuning | 4 | 3 | 7 |
| Warm-up | 0 | 0 | 0 |
| Writing | 1 | 4 | 5 |
| Playing | 12 | 127 | 139 |
| Singing | 14 | 13 | 27 |
| Speaking | 407 | 291 | 698 |
| Extra production | 2 | 2 | 4 |
| Mixed production | 12 | 25 | 37 |
| Digression | 1 (starts) / 7 (finishes) | 9 (starts) / 3 (finishes) | 10 |
| Rest | 8 (starts) / 6 (finishes) | 2 (starts) / 4 (finishes) | 10 |

Even though *verbal production* lasted for a shorter time than *musical production*, the teacher and student often talked and there was a certain balance between their use of *verbal production* as compared to the more traditional lessons described in the Introduction (Kotska, 1984; Persson, 1996; Rostvall & West, 2003; Tait, 1992; Yarbrough & Price, 1989). In this regard, the teacher's practice diary says:

> *I had great fun in this lesson because the student spoke her thoughts out loud and concentrated. It was very easy for me to follow her thoughts and she followed me easily too. This student speaks so much and is so positive that is easy to get ideas based on what she says. I mean, for example, she sometimes invents the things we play in class. I know from experience that*

*what she learns in these lessons will be forgotten at home, and we may have to go back to them often, but if we talk about them, she will probably remember them more easily.*

Not much *writing* was used in these lessons. The teacher wrote down homework once, the student composed songs on paper four times, an activity that was suggested or proposed by the teacher every time.

In the following sub-sections, we describe in depth what the teacher and student talked about and played in order to understand the logic behind this general structure. We look in detail at the frequencies with which each code appears in the teacher's and student's practices during the video-recorded lessons.

### 3.1.1.1. First lesson

During the first lesson, in addition to *verbal, musical*, and *mixed production, digressions* and *rests*, teacher and student performed other typical classroom activities such as *tuning* the instrument at the beginning of the lesson, followed by cooperative work on aspects of bow distribution and coordination of right and left hands or analyzing the rhythms of a piece. The student worked on relative solfège by *singing* and *playing* at the same time with rhythm and with relation to the physical map of the instrument (relationships between sounds and their exact place on the fingerboard – where the strings are stopped with fingers in order to change the pitch) and composed her own musical piece while the teacher sang briefly to manage the student's attention. Time was also spent on aspects such as breathing or body position with relation to the instrument.

Both teacher and student used *explaining, asking, suggesting* and *answering*, while only the teacher used *informing, giving instructions* and very rarely, *modeling*. The student corrected herself without the teacher using correction. Most of the processes included in the SAPIL appeared in this lesson, except *negative evaluation, negative attribution* and *intrinsic motivation*. Both teacher and student used most of the actions, while *rote learning, positive evaluation* and *extrinsic motivation* were used only by the teacher.

The teacher's and student's classroom practices focused on outcomes of *notational*, *syntactic* and *analytical* aspects of scores, and *psychomotricity* with regard to body position and breathing. The teacher also focused on the student's *memory* work to learn the score.

### 3.1.1.2. Second lesson

The typical classroom activities in this lesson were *tuning* at the beginning, followed by *extra* and *mixed productions* to continue the work with relative solfège and rhythm. This time, most of the work focused on left hand finger pressure on the fingerboard. At the end of the lesson they worked on the natural harmonics (notes which sound by slightly touching the strings with fingers) to relax tension in the student's hand. They both used *singing*, through association of songs with similar notational material. In contrast to the first lesson, only musical pieces were worked on. Practically all observable actions were used by both teacher and student, except *giving instructions* and the few *modeling* moments, which were used by the teacher.

*Memory with transfer*, *comprehensive learning*, *planning*, *positive attributions* and *attention management* were worked on, as in the first lesson, by both student and teacher. In addition, in this lesson, they both used *positive evaluation* and *intrinsic motivation*. Only the teacher used *reproductive memory*, *rote learning*, *negative evaluation* and *mental representation*.

With regard to teaching and learning outcomes, they both maintained interest in *notational* aspects and *psychomotricity*, although in this lesson they worked together on the *referential* rather than on the *analytical* or *syntactic*, and added *memory* work. *Sound production* was represented only in the student's discourse.

### 3.1.1.3. Third lesson

With regard to typical classroom activities, both student and teacher used *singing* through association of songs (once together with learning the song or solfège) and *mixed production*. The teacher focused on *tuning* the instrument for a few minutes after starting the lesson. In the post-lesson interviews, she explained that she realized that

they had forgotten to tune the instrument, which they usually did at the beginning of the lesson. Since the tuning was not too bad, she decided that she would rather proceed with the lesson until she found an opportunity to tune. Meanwhile, the student made notes on the score and used *extra production* several times. As in the second lesson, most work here was on the *musical pieces* and other matters related to left-hand fingering (in up to six separate episodes), *tuning* and the instrument's intrinsic sound. The observable actions were the same as in the second lesson.

In line with the two previous lessons, processes such as *retrieval with transfer*, *rote learning*, *comprehensive learning*, *positive evaluations*, *positive attributions* and *attention management* appeared in the discourse of both teacher and student. During this lesson they both assigned importance to *intrinsic motivation*. The differences in this lesson were that neither teacher nor student used *reproductive memory*, *mental representation* or *negative attribution*. The teacher dealt briefly with *study characteristics*, *extrinsic motivation* and lesson *planning*, while the only the student used *negative evaluation*.

The teaching and learning outcomes of this lesson were nearly the same as those in the second lesson, except that in this case both teacher and student added work on *expressiveness* or *referential* aspects of the musical piece and *sound production* of the instrument, while *memory* appeared only in the teacher's discourse.

### 3.1.1.4. Fourth lesson

This lesson was structured along four *digressions*, through which various subjects emerged, such as finger pressure on the fingerboard, structural analysis of the parts of the piece, taking note of rhythms, different episodes about bow position and distribution, and work on fingering according to the positions and strings. Both teacher and student sang with a combination of aspects such as solfège and association of songs, made notes on the score and tuned the instrument at the beginning, and only the student used *mixed production*. The *musical pieces* were worked on during most of the lesson, as in the two previous ones, although time was also allowed for the student to create short melodies with the material learned during the lesson. The observable actions were the same as in the second and third lessons, except that here, only the

student corrected.

Again, the learning processes used by teacher and student were *retrieval by transfer*, *comprehensive learning*, *positive evaluation*, *attention management*, *intrinsic motivation* and *mental representation*. They also both used *negative evaluation*. During this lesson, the teacher had greater control over the student than in any of the previous ones with regard to the use of *reproductive memory*, *rote learning*, task *planning*, *positive* and *negative attributions* for achievement and *study characteristics*.

With regard to learning outcomes pursued by teacher and student, they both mentioned *notational* aspects such as natural harmonics, rhythms, intervals and fingerings in connection to the analysis of different parts in the piece plus what the relationship was between different pieces with similar material. They also spoke about the titles and themes of the pieces, and what the student felt they meant referentially. The teacher mentioned *memory* work, while the student talked about *sound production* with the instrument.

### 3.1.2. Outcomes, processes and conditions: An overview

#### 3.1.2.1. Procedural learning outcomes

*Psychomotricity*, usually related to the work of the right and left hands, as well as to breathing or positioning the body with relation to the instrument, were the most frequently used procedural outcomes, with similar frequency in both teacher and student. *Expressiveness*, such as intention in phrasing or using the body to help express a musical idea, was used very few times in these lessons, and only by the student. For *sound production* features, the student, as a real initiator of musical ideas through music making (Wiggins, 2007, 2016), showed greater interest, doing so on 5 occasions, usually in the episode during which she realized how the sound of the instrument is transmitted or expands through the f-holes and corpus of the cello.

*Memory* was managed seven times by the teacher, in a very basic way, by *asking* the student to remove the score and play the piece by heart. In the post-lesson interviews, the teacher explained that her aim had not been to get the student to

memorize, but to work on other aspects such as flow of body movements without tension while reading the score. Since the student was just beginning to learn notation, she sometimes concentrated more on *notational* aspects of the score, tensing her body when unsure of notes, rhythms or fingerings.

**Table 3.** Frequency of appearance of the codes included in 'procedural learning outcomes' in the SAPIL

| Code | Teacher | Student | Total |
|---|---|---|---|
| Psychomotricity | 33 | 31 | 64 |
| Expressiveness | 4 | 1 | 5 |
| Sound production | 2 | 5 | 7 |
| Memory | 7 | 3 | 10 |

*3.1.2.2. Conceptual learning outcomes*

The *notational* level of the scores was worked on most during the lessons, perhaps because it was a beginner's level. It was usually represented by fingerings, bows and notes, and sometimes also related to dynamics. The second most important level in these lessons was the *referential*, usually related to communication and *expressiveness* and the context for both. The somewhat more complex relations in the *analytical* level were worked on, although to a lesser extent than the other levels. The frequencies for teacher and student were similar for all three levels.

**Table 4.** Frequency of appearance of the codes included in 'conceptual learning outcomes' in the SAPIL

| Code | Teacher | Student | Total |
|---|---|---|---|
| Notational | 23 | 22 | 45 |
| Analytical | 5 | 5 | 10 |
| Referential | 9 | 10 | 19 |

*3.1.2.3. Learning processes*

*Extrinsic motivation* only appeared twice, managed by the teacher, while *intrinsic motivation* appeared much more often, managed mostly by the teacher and only five times by the student. The teacher's practice diaries mentioned *intrinsic motivation* several times:

> *I like the student to feel happy with her skills. I don't like doing things*
> *that are too difficult. The students usually choose the order of the pieces*
> *we work on in class, and I choose novel tasks for them, something they*
> *like. I remember that this student showed me a picture of her cat at the*

*beginning of the lesson, and I remembered the song "Cat's SOL-MI", which was perfect for the situation [...] if I let her play only open strings I think she would get bored, and I probably would too; I have to keep them motivated in what they are doing...The motor process with a beginner takes up a lot of time, so you need to provide a wide variety of short, parallel activities to ensure the student feels she is progressing easily on her own.*

**Table 5.** Frequencies of appearance of the codes included in 'learning processes linked to motivation' in the SAPIL

| Code | Teacher | Student | Total |
|---|---|---|---|
| Extrinsic motivation | 2 | 0 | 2 |
| Intrinsic motivation | 21 | 5 | 26 |
| Positive attribution | 17 | 6 | 23 |
| Negative attribution | 2 | 1 | 3 |
| Positive evaluation | 49 | 7 | 56 |
| Negative evaluation | 4 | 10 | 14 |

The student seemed to be more critical and demanding than the teacher, as the student evaluated negatively, while the teacher usually evaluated or attributed learning achievements positively. Moreover, the teacher did not seem to make too many *negative attributions* or *evaluations* about the student's performance of the tasks, and focused on the student's *intrinsic motivation* when learning the task as predicted by the constructive model described in the Introduction, such that each error the student made served as a learning tool and personal challenge rather than a penalty. This can have substantial effects on motivation.

For the four weeks of lessons, in answer to the practice diary question *"Did any of these thoughts come to mind during the lesson?",* the teacher never ticked any of the negative options provided (*"This piece is impossible for the student", "She is very out of tune", "The rhythm is not right", "How is it possible that she confuses the up and down bows so much?", "I'd like to be at home right now!"*) On the contrary, she chose many of the positive options every time (*"You have played that very nicely", "We can do it", "We are enjoying this"*) and on several occasions, the rest of the positive options.

Similarly, the student selected positive options such as having played well, being able to play, and considering the study material nice (9 times), followed by having played in tune (8 times), that the bows were simple (6 times) and that the rhythms were

easy (4 times). In the blank space provided in the study diary for "*Other thoughts?*", her comments were: "*Very good!!*", "*I love it!*", "*Nice!!!*", "*It's nice*", or "*Wonderful!!!!!*" The translation of the options provided in the study diary are as follows: "*Here, the teacher would ask…*", "*Here the teacher would show…*", "*Here the teacher would explain…*", "*I played it very nicely*", "*This passage is impossible*", "*I can do it!*", "*It takes a lot of effort from me*", "*How boring!*", "*What fun!*", "*I play quite a bit out of tune*", "*I play quite well in tune*", "*I can play these rhythms*", "*Rhythms are easy*", "*Bowings are logical*", "*I get confused with the bowings*", "*Other thoughts?*".

**Table 6.** Frequencies of appearance of the codes included in 'learning processes linked to cognition' in the SAPIL

| Code | Teacher | Student | Total |
|---|---|---|---|
| Reproductive memory | 5 | 2 | 7 |
| Memory with transfer | 19 | 19 | 38 |
| Rote learning | 8 | 1 | 9 |
| Meaningful learning | 24 | 25 | 49 |
| Planning | 21 | 5 | 26 |
| Attention management | 36 | 18 | 54 |
| Rehearsal characteristics | 5 | 2 | 7 |
| Mental representation | 17 | 6 | 23 |

The frequencies of use for both *meaningful learning* and *memory with transfer* were high and similar for teacher and student. This indicates interest in understanding the tasks being performed in order to learn deeply and comprehensively (as described for the constructive model in the Introduction), rather than focusing on mechanical repetition and personal rehearsal without reflection. In contrast, they worked much less on *rote learning* or *reproductive memory,* which are less complex processes. As an indicator of what we have just seen with regard to these learning processes, the student answered the interview questions *"Do you think that some teachers are better than others?"* and *"What are these teachers like?"* by saying that her teacher is "[...] *one of the best teachers. She understands what I am thinking. She helps me if there is something I don't know how to do yet. And during the lesson I play better and better because I understand things."* It is not surprising that in the multiple choice videos she chose the constructive options as her favorite, rejecting all phases in the transmissive videos (planning, supervision and evaluation), or that she associated her teacher to the constructive practices shown in the videos.

During these lessons, the teacher used *planning* and *mental representation* very often, while the student used them very little. *Attention management* was the process that was most used overall, with the teacher managing it two thirds of the times. The second most frequently used process was *comprehensive learning*. There was not much emphasis on how or how much the student studied. On five occasions, the teacher simply briefly suggested tasks that the student could do at home if she was interested. However, the student's study diaries recorded that she studied on 13 out of 24 possible study days, enjoyed studying very much 11 times and enjoyed studying much twice.

### 3.1.2.4. Learning conditions

Although the teacher gave a large number of instructions, there was quite a lot of emphasis on *asking* questions, both by the teacher and the student. This implies a dialogical structure, also observed in actions such as *answering*, *explaining* or *informing*, which they both used frequently.

**Table 7.** Frequencies of appearance of the codes included in 'types of action' in the SAPIL

| Code | Teacher | Student | Total |
|---|---|---|---|
| Informing / Knowledge transfer | 14 | 21 | 36 |
| Answering | 32 | 47 | 79 |
| Explaining / Arguing | 27 | 32 | 58 |
| Correcting | 13 | 5 | 17 |
| Giving instructions / Orders | 65 | 1 | 66 |
| Modeling / Demonstrating | 6 | 0 | 6 |
| Asking / Doubting | 167 | 105 | 272 |
| Proposing / Suggesting | 63 | 7 | 70 |

The teacher *corrected* more than the student did, although they both did so infrequently and there was very little *modeling* by the teacher. The teacher often *proposed* tasks or exercises, while the student seldom did so.

Participation cycles were connected to the degree of involvement, collaboration and responsibility of student and teacher when performing different tasks. The most frequent cycles were *Teacher + Student evaluation* cycles and *Teacher + Student answer* cycles, indicating that many of the processes and outcomes of these lessons were managed jointly and dialogically, as would be expected in constructivist practices (the more participative, the more dialogical). There was also a considerable number of

*Teacher evaluation* cycles, where the teacher closed the activity and evaluated, and of *Teacher answer* cycles, where the teacher answered in order to close a cycle, with the student making a small, though real intervention.

**Table 8.** Frequencies of appearance of the codes included in 'types of participation cycle' in the SAPIL

|  | Evaluation cycle | Answer cycle | Open cycle |
|---|---|---|---|
| Teacher | 11 | 4 | 0 |
| Teacher + student | 10 | 16 | 3 |
| Teacher + Student | 25 | 30 | 3 |
| Student | 0 | 2 | 0 |

To sum up, some of the more important features were that *stage presence* was not worked on, and that the student was not instructed to study at home or to study by rote, although this did not seem to affect her studying at home and feeling motivated to do so, according to her study diaries. *Extrinsic motivation* appeared little, and the teacher did not usually model or correct, nor did she evaluate negatively or attribute the student's mistakes to negative issues. The student, in contrast, was self-critical, though as a driver for learning and achievement rather than as a penalty.

The simpler cognitive processes such as *rote learning* or *literal memory* appeared less often than the more complex processes related to deep understanding of the music being learned, such as *memory with transfer* or *comprehensive learning*, which were usually managed jointly. *Attention management*, *mental representation* and *planning* also appeared frequently, usually regulated by the teacher. Student and teacher asked a lot of questions, but also explained, argued, answered or informed cooperatively, so that many of the conditions were managed jointly, even though the teacher used instructions more often (though not necessarily with relation to *playing* the score, but rather to aspects of the student's understanding of what she was doing).

## 4.1. Discussion

Our first aim was to use the SAPIL to describe in depth a constructive teacher's practices with a student. We also wanted to assess whether the teacher's practices were consistent with her conceptions, in which case they would be sufficiently complex to represent the constructive approach, and student's cognitive processes would be the main object of learning.

In the first stage of analysis we looked at the general features of the lessons. We found that all four lessons were similar in duration and structure regarding talking, playing, tuning and inactivity, for both teacher and student. The student played much more than the teacher, and they both sang and talked a lot, which could be connected to the study on expert teaching by Henninger et al. (2006). All four lessons included several long rests (initiated by the teacher and related to psychomotor relaxation) and digressions (initiated by the student with regard to her own personal experiences), in addition to quite a lot of inactivity. This contrasts sharply with the typical patterns of traditional lessons described in the Introduction. In traditional lessons, students rarely participate or talk (Kotska, 1984; Persson, 1996; Rostvall & West, 2003; Tait, 1992; Yarbrough & Price, 1989). Moreover, resting and inactivity are discouraged. In the belief that full use should be made of lesson time, teachers constantly correct and interrupt any poor playing in order to ensure plenty of activity (Duke & Henninger, 2002; Siebenaler 1997).

In the four lessons we observed, one of the main learning outcomes pursued was not change in the student's actions, but how the student actually interacts with the instrument or represents her relationship with the instrument. Thus, the teacher focused on the student's mental representation by encouraging the student's awareness of the physical processes of making music (Millican, 2013). This connects to her intrinsic motivation and the use of musical scores appropriate to her level or to the processes involved in learning. This is expected from experiential learning focused on processes rather than on content (Wiggins, 2015; Wiggins & Wiggins, 1997). Teacher and student worked together on notational and referential aspects, and much less on analytical aspects such as technical exercises, which were practically non-existent (in contrast to Karlsson & Juslin, 2008). Stage presence was never worked on and there was far more work on psychomotor aspects than on aspects of expression or sound. There was work on memorization, but with relation to bodily concentration, not reproduction of musical scores. The teacher used highly complex conditions and processes to manage the contents and focused on deeper ways of the student learning sheet music – as partly found in the study by Cheng and Durrant (2007). This is also in line with the holistic view or authentic conception of instrument learning and teaching proposed by Wiggins (2007, 2015), in which students feel empowered to construct knowledge personally

meaningful to them after the teacher's scaffolding activities. Further studies could analyze whether this type of complex management is internalized in the student's practices with its consequent transfer of control.

This teacher wanted the student to play well, which is connected to the way in which she managed the student's learning processes. With regard to the processes in the SAPIL, it is worth noting that intrinsic motivation appeared several times while extrinsic motivation never did. No emphasis was placed on studying; nevertheless the student did often study at home, as shown in the study journals. The teacher issued several positive evaluations and attributions and a few negative ones, because she was interested in the student's self-esteem and self-confidence, in contrast to teaching styles that focus on technical mastery as described in the Introduction (Karlsson & Juslin, 2008). The student used more negative evaluation, displaying a critical spirit and showing the desire to continue working in order to improve. They worked together on more complex processes such as comprehensive learning and memory with transfer, which influenced the student's choice of constructive teaching videos as her favorites in the structured interview, associating the teacher with the features typical of constructive, friendly, well-prepared teachers. However, it was mainly the teacher who managed the aspects involving planning and managing the student's attention and mental representation.

With regard to learning and teaching conditions, there was a clear dialogical structure, with both teacher and student constantly asking questions, but also answering, explaining and informing. It is important to train teachers for deliberate questioning (Hughes, 2005), which helps students engage in their understanding of musical concepts – thus becoming critical thinkers (Haston, 2013). Questioning might also be helpful in developing awareness skills when students play their instruments, and in increasing teachers' awareness of their students' understanding (Millican, 2013). In this line, the teacher encouraged the student to think and participate actively and verbally whenever possible. However, there were other aspects, which were also represented mainly in the teacher's practices, such as giving instructions, suggesting tasks or correcting (though not too often). This teacher used modeling on a few occasions. The most frequent interaction cycles were joint (Teacher + Student) evaluation and answering.

In general, we observed that the SAPIL is a very powerful tool for encoding this type of individual instrument lesson, regarding both practice and discourse. Even though we did not analyze in depth the teacher's practice journal and the student's study journal, or the interview with the student and the post-lesson interviews with the teacher, they were very useful in providing examples of some of the most relevant aspects found in the encoding. An in-depth analysis of the rest of the materials, which have only been used as a basis for the description of the results in the case study, is pending.

*4.1.1. Conclusions*

This study analyzed in depth whether a teacher who holds a constructive conception of teaching and learning is able to carry out constructive practices, and if so, how that goal is attained. Many features in these lessons differ noticeably from those in studies that analyze more traditional lessons, described in the Introduction: there was dialog (e.g. Alexander 2008; Mercer, 2008), the teacher did not stop the student or correct her immediately (Goolsby, 1996), a lot of work was done on the notational, but also partly on the analytical (Mawer, 1999) and the referential levels of the score (López-Íñiguez & Pozo, 2014b, Marín, Pérez Echeverría, & Hallam, 2012). This teacher clearly sought to encourage a reflective learner who is active during the lessons, since she made the student think explicitly on several occasions. Indeed, following Perry, et al. (2002), when teachers perform self-regulating activities and get their students to view errors as opportunities for learning, children begin to use more complex cognitive processes related to concentrating on their personal progress and progress in the task. Children also begin to evaluate their progress and select what and how to study.

We found a solid relationship between what this teacher thinks and what she does during lessons. This provided some insight into whether the old adage "easier said than done" is true. However, there is still somewhat of a gap between her conceptions and practices, according to the model proposed by Pozo (2008) on learning conditions, processes and outcomes. It is worth enquiring whether this gap is due to the existence of hierarchical integration in her practices. Although her general approach to lessons is constructive, she may sometimes include more teacher-centered features such as managing certain processes. This may be due to the student's young age, since joint

process management could be expected with older students. We believe that in the light of the data from this case study, practice has great capacity to inform theory (Meyer and Turner, 2002) or in our case, to inform conceptions. This is directly related to initial training for instrument music teachers. Although teacher training courses officially adopt an approach to teaching and learning based on constructivist assumptions, these assumptions do not appear to influence teachers' conceptions once they are actually working (Martín, Pozo, Mateos, Martín, & Pérez-Echeverría, 2014). It is important to take this into account, in order to encourage processes of connection between theory and practice in curricula, going beyond technical rationality (Schön, 1987).

Lastly, some of the features that we consider particularly positive are the atmosphere of relaxation and enjoyment that this teacher created in her lessons, and the importance she attached to the student's intrinsic motivation which, as we have seen, is essential to playing an instrument satisfactorily (Maehr, Pintrich, et al., 2002). This is important because children who succeed in learning musical skills to play an instrument usually describe their teachers – both in the early stages and at their current level – as friendly, talkative, relaxed and supportive of student autonomy (Davidson, Moore, Sloboda, & Howe, 1998; Howe & Sloboda, 1991; Sloboda & Howe, 1991; Sosniak, 1985). Schenck (1989) makes this very clear, and adopts the stance that learning an instrument should above all be fun. In this regard, Hallam (2011) claims that students' future musical aspirations is also predicted by their enjoyment of musical activities, their attitude towards the instrument, the value of music to them, their self-beliefs and their study strategies.

We might expect constructivist teaching and learning to be more enjoyable for both teachers and students than other more transmissive approaches, perhaps contributing to positive feelings and reducing teacher burnout. As discussed in the article by López-Íñiguez et al. (2014) on the conceptions held by string instrument teachers, more constructivist teachers might suffer burnout, feel demotivated in their work, and eventually embrace teacher-centered pedagogies because of the less innovative educational culture often present at music institutions. On the other hand, constructivist learners tend to speak more about positive emotions (Casas-Mas, Pozo, & Scheuer, 2015; López-Íñiguez & Pozo, 2014b). This is partly because teachers focus on their needs and learning pace, which makes teaching and learning more enjoyable. In

any case, conceptions of teaching and learning are an important factor in providing enjoyment when teaching and learning. Further studies could be conducted in order to ascertain whether there are any other factors that enhance enjoyment of instrumental lessons.

In addition, we need to conduct research from other methodological standpoints on teachers representing different conceptions and different levels of expertise, and in other instruments or learning cultures, in order to continue narrowing the gap between conceptions and practices and to help clarify, generalize or contradict the data. Longitudinal case studies to analyze the effect of instructional level, age or timing in different approaches to teaching and learning to play an instrument would help achieve better understanding of the relationship between teaching conceptions and practices and the effects and characteristics of constructive teaching at various levels. In addition, the capacity of the SAPIL for adaptation to other types of interaction should be studied, such as chamber music or orchestral large ensemble rehearsals without a teacher or a conductor, or even solo rehearsals.

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