SAPEA: A System for the Analysis of Instrumental Learning and Teaching Practices

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1 What is the Point of Analysing Instrumental Learning and Teaching Practices?

As we have just seen in previous chapters, ways of learning and teaching are determined by how teachers and students conceive of their learning and teaching functions: what do they think learning and teaching is? What are the goals they hope to achieve? What must the student do to learn and how can the teacher help them? What should evaluation consist of? etc. We have also seen that in music classes a considerably large or small gap may exist between what is said and what is done (López-Íñiguez & Pozo, 2016; Torrado & Pozo, 2006). In actual fact, this is quite common to the way we think in any area. There is always a dissociation between our implicit and our explicit mind (see chapter How Teachers and Students Envisage Music Education: Towards Changing Mentalities). It is clear that our most explicit ideas on the environment and how to care for it are not always, on a more implicit level, rendered into sensitive and meticulous actions, in the same way as our explicit attitudes to any discrimination (be it gender, ethnicity or social conditions) are not always congruent with our implicit behaviour or attitudes (Gawronski & Strack, 2004; Gawronski et al., 2017).

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This distance between what we think or say (to others, but also to ourselves, our conceptions) and what we really do (what someone would see if they observed what was happening in that class, our practices, in the most objective way possible) is not just a phenomenon of the classroom and still less of instrumental teaching. This disassociation is fairly inherent to the human mind (Pozo, 2014), and therefore particularly important to be aware of if we wish, as appears desirable in our case, to reduce that distance between what is said and what is done (Torrado & Pozo, 2006) to improve musical education and more specifically instrumental learning. Although students, families and other educational agents are exposed to teachers' beliefs and ideas, they are not exposed to their teaching methods: what they do, the activities they propose. Students are not normally inclined to read curricular programmes, but they go to class and try to respond to the demands made on them there.

As a result, if we wish to understand learning and teaching from *research* we have to be capable of analysing and deciphering what is happening in the classroom and what practices occur there in the most objective way possible, without of course losing sight of how these practices come into play within the framework of conceptions analysed in previous chapters. Equally, when contemplating educational *innovation*, for achieving the goals of a new education (see chapter "Learning and Teaching Music in the 21st Century", also Ballentine, 1984; Elliott, 2007; Hallam, 2010), we should not only change the discourses and theories which to a large extent has been done already (see chapters "Teaching Music: Old Traditions and New Approaches", "The Psychology of Learning Music" and "How Teachers and Students Envisage Music Education: Towards Changing Mentalities"), we also have to change practices, what is happening on a daily basis in the classrooms.

Finally, as we shall see in the Part Three of the book, these attempts to renew musical education and more specifically instrumental education mainly come about through a new form of conceiving *teacher training*, where the key issue is to help teachers rethink and restructure their teaching practices (see chapter "Instrumentalist Teacher Training: Fostering the Change Towards Student-Centered Practices in the 21st Century"). They need to start from where they already are, through reflection on their own teaching (Schön, 1987; also Martín & Cervi, 2006), so that new forms of learning and teaching may be fostered, in keeping with the new approach to music education.

2 What Actually Happens in Music Classes?

For the advance of research, innovation and teacher training it is essential to analyse and reflect on learning and teaching practices. These are the three pillars upon which educational change would be upheld. In this chapter we shall demonstrate how this analysis requires probing into practices, but also becoming familiar with the conceptions of teachers and students, in the knowledge that it is only from these conceptions that we may interpret what happens in the classroom. Notwithstanding, and above all, instruments beyond intuition and subjective personal experience are required to

help us describe as objectively as possible, and based on shared categories, what is actually happening in a classroom, what actions are being taken, how they are being organised and how they are being experienced by teachers and students. Let us see why this is important.

2.1 From Conceptions to Practices

As stated, this emphasis on the importance of analysing practices does not mean that we do not also need to be familiar with the conceptions. Although there is a distance between what people believe they do and what the "really" do (in music education, for e.g., López-Íñiguez & Pozo, 2016; Torrado & Pozo, 2006; in other fields, Buehl & Beck, 2014; Clarà & Mauri, 2010; de Aldama & Pozo, 2016; Lim & Chai, 2008; Pozo et al., 2010), it is also true that the conceptions reflected through the conceptual profiles mentioned in chapter "How Teachers and Students Envisage Music Education: Towards Changing Mentalities", are usually a decent predictor of these practices (Pozo, 2017; Pozo et al., 2016).

For a start, we may state that these different conceptual profiles help to identify different learning and teaching styles in practice (in different musical cultures, see Casas-Mas et al., 2015b; in choral rehearsals, Corbalán et al., submitted; in instrumental teaching contexts, López-Íñiguez & Pozo, 2016). Knowing what a teacher or a student says or how they interpret what happens in a classroom, allows us to infer several essential traits of what that teacher or student does in the classroom. In a similar light, an explicit attitude towards sex discrimination is a pretty good prediction of how that person will behave in these situations, especially when the circumstances of that situation help them to be aware of how they are acting (Girvan et al., 2015).

Repeating what was explained in chapter "The Psychology of Learning Music", we may say that there is a critical distance between conceptions and practices which, from a bolder or more promising but as yet not completely empirically validated interpretation, would suggest that the conceptions would act as the *zone of proximal development* of practice itself (Torrado & Pozo, 2006). In other words, people could explain what they propose or would like to do, but they are not always capable of effectively doing or putting it into practice due to external or internal circumstances or barriers (Ertmer, 1999; also see chapter "How Teachers and Students Envisage Music Education: Towards Changing Mentalities"). This may be due to the experience and strategies they had learned along the way. According to this interpretation, conceptions would always be some steps ahead of action, and would be an essential element in changing these practices through reflection on them, as we shall see in Part Three of this book.

However, if according to this interpretation the conceptions define what teachers and students would be capable of doing if they had the help they required or the right conditions and necessary processes, but they are still not able to do themselves (i.e., their zone of proximal development according to Vygotsky, 1978), the fact

is that students and teachers in their daily work in classrooms are exposed mainly to more or less intuitive practices, to effective actions, that one and all programme and execute. However much the teacher verbalises ambitious, even grandiose, objectives to the class regarding the skills the student has to develop (expressiveness, sensitivity, self-governance, etc.), the latter will be more concerned with fulfilling the activities and assessments they are to face the following day (that passage with complex modulations, that rapid succession of arpeggios), that are not always in tune with such ambitious plans. For better or for worse students do not usually read curricular syllabuses or teaching guides. They go to class, they get more or less involved in the activities carried out or proposed there, in what *is done there.*

Therefore, if we wish to become familiar with and possibly restructure instrumental learning and teaching, we have to analyse the practices that take place in these classrooms, without losing sight of other levels of analysis, whether these be the organisation of this teaching (see chapter "Teaching Music: Old Traditions and New Approaches") or the conceptions maintained by different educational agents (chapters "How Teachers and Students Envisage Music Education: Towards Changing Mentalities", "How to Know and Analyse Conceptions on Learning and Teaching" and "The Impact of Teaching Conceptions and Practices in Early Musical Instrument Learning"). One could think that knowing what really happens in the classroom is simple and that both teachers and students could easily explain to us what happens, since they are the ones responsible. However, we must move beyond this intuitive belief that the person who best knows what is happening is the one experiencing it and that it should be enough for teachers and students to explain to us what they have done and what they are doing. The truth is, observation, analysis and comprehension of educational practices is one of the most complex challenges of educational research, both theoretically and methodologically (Barberà, Mauri & Onrubia, 2008; Clarà & Mauri, 2010; Coll & Sánchez, 2008; Lemke, 1990; Sánchez & Rosales, 2005; Sánchez et al., 2008).

2.2 From Intuition to Analysis of Practices

Although intuitively students, but above all teachers, may believe that they really know what is happening during music classes since they are the ones deciding, supervising and assessing the activities, the truth is that in a classroom and even in the context of a traditional instrumental class with one teacher and one student, so many things happen at the same time (actions, gestures, movements, emotions, verbalisations, sounds, silences, etc.) that it is impossible for any teacher or students to capture all of them *on the fly.*

Anybody who has recorded a class for any reason, be it for research or an innovation or professional development project, knows that analysing what has occurred takes up far more time than the time in class, because so many highly significant things happen and they normally are not initially noticed. The teacher or the student may well be unaware of them happening (that fleeting look of displeasure when

the students start their interpretation; the obsessive stare of the student at the sheet music whilst they are playing; the authoritarian gestures which accompany the verbal instructions of the teacher or the smile of satisfaction on seeing how the student regulates their breathing before starting a phrasing; the tremble in the student's voice when they ask a question or the appreciative look of the teacher when a passage sounds expressive and finely tuned).

An hour's class is always much richer than any theory or explanation we can give to those who participate in it (this explanation is very important to help understand what has happened, as we have seen), since, as we saw in chapter "How Teachers and Students Envisage Music Education: Towards Changing Mentalities", many of the actions and representations that occur are much more implicit in nature (unconscious) than explicit (conscious) (Pozo et al., 2006). It will therefore be necessary to record or note down that class in some way, observing in detail what happened with some sort of guided analysis system in order to bring to light a good part of these hidden actions, most of which are submerged, occurring in an apparently simple or routine class.

However, it is not just the complexity of what happens in the classroom interactions (or for that matter, any other social context) that makes those who participate in it disregard so much of what happens and only be capable of explaining a minor part of these interactions and their consequences. What one person or another perceives is biased by their own expectations or beliefs, by their conceptions, but also by the focus of attention on learning activities. Attending the same classes, teachers and students normally perceive different things because their expectations and conceptions are different and similarly different students also perceive different things. Only a third person's outlook can help to reconcile these different interpretations, so that each individual can go further than what at first sight, or intuitively they perceive or feel in that class. In this way, developing instruments for practice analysis, in our case within the framework of instrumental learning and teaching in music, is an essential resource for adopting an experiential focus in innovation and teacher training, a new vision may be formed, or a re-description determined by this system of analysis, from the real experience of the teacher and student. This has been supported by watching videos by the people taking part (see chapter "Instrumentalist Teacher Training: Fostering the Change Towards Student-Centered Practices in the 21st Century" in this respect), because the researcher also has his or her own bias. A global view of the different empirical investigations of several proposals for analysis of learning and teaching practices will now be made.

3 Proposals for the Analysis of Learning and Teaching Practices

3.1 Analysis Models and Dimensions of Interactions in the Classroom

Over the last few decades much research has been conducted on learning and teaching practices in classrooms (Barberà et al., 2008; Clarà & Mauri, 2010; Coll & Sánchez, 2008; Lemke, 1990; Sánchez & Rosales, 2005; Sánchez et al., 2008). Among the different types of focus and methodologies analysed, definitely one of the most influential approaches in this new research agenda has been the study of the classroom as a space for interaction determined by the way in which educational agents speak, determined by an analysis of discourse, i.e., of what is spoken there. From a socio-cultural viewpoint, Mercer (1995; Edwards & Mercer, 1987) proposed a model of analysis of the interaction sequences, in an attempt to reveal the mechanisms of educational influence that teachers use for joint construction of knowledge with their students (Coll et al., 1992), and the different types of conversation that take place between the students themselves (discussion, accumulation, exploration) that make it possible for increasingly complex levels of collaboration and construction to occur (Engel & Onrubia, 2013; see also chapter "From Individual Learning to Cooperative Learning").

Other different but complementary approaches have emphasized the content of interactions between teacher and students and on how the discourse in the classrooms is managed by the teacher, to encourage a more complex appropriation of educational contents. Thus, Cazden (1988) for example proposed analysing talking in classrooms in terms of a series of communicative strategies or dialogues, among which the IRE sequences would stand out, so-called because they would begin with (I) ("interrogar" which in Spanish means to question), a question formed by the teacher which would give place to (R), one or several responses by the students and finally (E) to be evaluated or reconsidered by the teacher. These interactive sequences would give rise to different variations (e.g., Coll et al., 1992; Edwards & Mercer, 1987; Lemke, 1990; Sánchez & Rosales, 2005; Sánchez et al., 2008), from those where the teacher could take on a more directive role in each of their phases to those others in which final evaluation of the process would remain open and which the students themselves would have to close.

However, this analysis of the structure of participation in a class (in terms of IRE, IRF, symmetrical patterns, etc.), according to Sánchez et al. (2008) would reveal *how a class is executed*, but it would be necessary to complete this with another two dimensions of practice, *what is done*, i.e., the content of the representations and processes carried out and *who does it*, depending on the level of participation of the students and the type of hot and cold assistance received from the teacher. Other studies have also stressed what is done, but not necessarily what is said, emphasizing other dimensions of learning and teaching practices like, for example, the explicitly

or implicitly cognitive processes managed by the teachers and students, the cognitive demand of activities, the level of the meta-cognitive management the students require of them, the memory or recovery strategies used, their level of involvement or motivation, etc. (Hora & Ferrare, 2014; Hora et al., 2013). Other forms of analysis have also incorporated other non verbal actions present in learning and teaching practices. But which also play a role in the construction of knowledge in the classrooms, such as gestures, actions, private singing with different types of internalisation and bodily representations (Casas-Mas et al., 2015a, 2019; Goldin-Meadow, 2003; Neill, 2017).

As shown therefore, classroom occurrences may be analysed from many dimensions or planes and are always richer or more complex than the models and methodologies that attempt to analyse them. However, if none of the approaches we adopt can capture the entire wealth of interactions taking place in the classroom, a more complete vision would require a multidimensional analysis that takes into account the different components outlined. etc. (Hora & Ferrare, 2014). To do so, we would start from the analysis proposed in chapter "The Psychology of Learning Music", based on three essential components of all learning: *results*, *processes* and *conditions* (Pozo, 2008). As we shall see later on, each of these essential components or dimensions is again divided into different categories or sub dimensions, the interaction of which provides us with a joint pattern of educational actions and intentions taking place in the classroom at any given moment and which may be adapted to different contexts and contents of learning and, in our case, specifically in instrumental learning.

3.2 Instrumental Learning and Teaching: Didactic Interactions, Based on Visible Actions

Research has introduced different forms of analysing instrumental practice and teacher-student interaction in this field. Compared with other educational scenarios, there are two traits which generally characterise instrumental music classes, that make them particularly apt from a theoretical and methodological viewpoint for these analyses. For one part, their generally dyadic nature (one teacher and one student), compared to most educational scenarios where a teacher works with a class of 25–30 students, makes analysis of interactions and identification of voices in the classroom much easier. Although incipient workgroups have been attempted (see chapter "From Individual Learning to Cooperative Learning"), for the most part classes are still individual, making analysis easier but possibly impoverishing learning. On the other hand, if we compare this to a language or mathematics class, a great part of what happens in the instrumental music class is observable: the movements and actions of the teacher and student can be discerned. This includes where they focus their attention, what they do with their body, with the instrument, even listening to the sound their actions produce and feeling the expressive direction of their interpretation and how they manage their emotions. However, when the student is thinking about how to resolve a problem or how to form a phrase, it is much more difficult

to infer their cognitive, embodied and emotional activity. Naturally, as we will see, similar situations also exist in music to those we have just described and there is a cognitive activity which is not directly observable that needs to be inferred but when they become obvious most, actions are easier to reconstruct and analyse.

Notwithstanding, not many structured systems of analysis for practice exist within the context of instrumental learning. In their time both Hallam (1997) and Jørgensen (1997), proposed theoretical models to analyse instrumental and vocal practice. Thus, for example, Jørgensen (1997) considered that the primary component of this model were the conditions which restricted or enabled learning opportunities: personal, instrumental and environmental factors. The second component was made up of factors which the learner can determine in every given situation, such as the goals of learning, strategies, content, time and means. The final element refers to the level of achievement in instrumental execution. Jørgensen's proposal (1997) is suggested as both a model of analysis and also as a tool for teaching students to practise and to help them develop their own learning strategies (Marín et al., 2012).

Several later studies dealt with the content of interactions between teachers and students regarding a specific teaching-learning process. These studies have a factor in common which is having been made through the analysis of class video recordings. Several subjects were analysed, including the analysis of verbal interaction understood as a means of constructing shared musical meanings (Viladot et al., 2010); the different patterns of group configuration produced in a group instrumental class (Baño, 2018; see also chapter "From Individual Learning to Cooperative Learning"); the particular attention paid to instrumental technique by instrument teachers (López-Íñiguez & Pozo, submitted); the intensity of interaction between instrumental music students and teachers (Heikinheimo, 2009); support from the teacher to encourage self-regulation of students during practice (Pike, 2017) and the critical analysis of restructuring pedagogic and reflexive processes with music students at different levels (Carey et al., 2017; Coutts, 2018).

Other authors such as Chaffin and Imreh (2001) analyse the structure of the instrumental learning sessions, fragmenting every session into two typical activities which are called run-throughs—playing top-down—, and works—working passages in depth. For her part, Zhukov (2004) speaks of a typical structure comprising three parts, clearly organised in time: warming up (tuning up, sound exercises, getting the fingers going, etc.), the main body of the class (technical work and repertoire) and closure (when homework is assigned and the time the student must dedicate to each activity they have to do at home). Other elements analysed and which are entwined in the previous structures are the waiting or "dead" times, which have been called digressions and which will be described in more detail later, due to their importance in interaction and learning (see chapter "The Choir Conductor: Interpreter or Maestro?"; also Casas-Mas et al., 2015a; Corbalán et al., submitted; López-Íñiguez & Pozo, 2016, submitted).

4 A System for the Analysis of Instrumental Learning and Teaching Practices (SAPEA)

In consideration of this background, the system of analysis presented below (SAPEA, for its initials in Spanish),[1] tries to unite several characteristics (GIACM, 2011). Initially, as with several of the models cited, it is a system which is based on a theoretical model, in this case the model presented in chapter "The Psychology of Learning Music", from recent developments in the psychology of learning. However, unlike those proposals, it has been empirically validated, applying it to different scenarios of instrumental learning both in contexts of conservatories (López-Íñiguez & Pozo, 2016, submitted; Marín, 2013), and in other contexts of informal and non formal learning contexts (Casas-Mas et al., 2019; Pozo, 2014). It has also been used to analyse contexts of vocal learning (Corbalán et al., submitted) and even in group learning in formal and informal contexts (Baño, 2018). These applications, the results of which some are included in several chapters in Part Two of this book and supported in the SAPEA, have led to a fine-tuning and completion of the initial proposal (GIACM, 2011) into a system which adapts to each new setting of musical learning. This system of analysis has also been adapted to other contexts of teaching which are removed from music (de Aldama et al., 2017).

Together with the above, SAPEA proposes a multidimensional analysis by integrating different components (results, processes and conditions), but also different levels of practice analysis, which include not just verbal interaction (what is said in class, who says it and how it is said), but also the instrumental actions: what is done with the instrument, and also with the body. It is therefore a system which differentiates between different types of activities, leading to the breakdown of what happens in the classroom into different units of analysis. As a result, following analysis, the identification of several components or types of actions simultaneously leads to a global or holistic vision of each episode or sequence of actions that take place in the classroom.

4.1 Units of Analysis of Instrumental Practice

Our proposal adopts the *musical unit* (piece of music, song, composition) being practised as its more basic level of analysis. Since several musical units are usually worked upon in one session (in a fragmentary or complete manner), analysis can also be arranged around a time unit (the teaching/learning *session*), whether this be a class, a rehearsal, etc. The musical units may differ from one another depending on their nature and musical content, at least in technical exercises, compositions, improvisations, creations, etc. In any event, the development of musical units occurs in one or several time units or practice sessions, wherein different *typical activities*

[1] Also called SAPIL by its English initials (System for Analysing the Practice of Instrumental Lessons) in some of the studies mentioned.

may be identified, according to Sánchez et al. (2008), on the understanding that these are the different parts into which a session is organised or structured in time. Depending on the meaning or function of these activities for musical execution or interpretation they would be:

- Warm-up/tuning up (preparation prior to the musical execution or interpretation).
- Musical production (or actual interpretation).
- Symbolic production: oral, gestural or written (referring to the musical production itself or to the warming up and preceding, interrupting or accompanying this production or after it has finalized).
- Other activities without musical content (digressions, pauses, etc. For example, a student saying to the teacher in the middle of any classroom activity: "*teacher, did you know that today is my grandmother's birthday? And yesterday my parents bought me a 400€ bike*").

These four main activities may also be divided into several subtypes. Thus, musical productions may be based on the actual instrument itself or on additional musical resources (humming, singing, clapping, etc.). Similarly, the symbolic productions with musical content may consist of oral or gestural communications or in writing. Finally, several of these activities may be combined with one another, creating mixed productions. Table 1 details all the possible activities that can be observed from these criteria:

Once these typical activities have been defined in an instrumental class or rehearsal, each activity could be segmented into different practice episodes. In our case, the Instrumental Episodes could be typically differentiated (when one or several of the educational agents, students or teachers are interpreting music, practising with the corresponding instrument) and the Discursive Episode (when one or several of the same agents talk or explain their representation on these instrumental actions). A Discursive Episode would normally be the result of communicative imbalance (a problem or a challenge) between what is expected to happen and what actually does, usually in the form of managing an error, a difficulty or a new challenge in student learning (or perhaps suggesting or reaching out to a new goal, maybe a Standard Activity). Therefore a Standard Activity would be broken down into a Sequence of Episodes (instrumental and discursive).

Each Session would therefore be broken down into different Episodes which could be analysed as units in themselves (either just the instrumental or discursive ones or both). An Interpretative Episode would be identified from the moment the musical production began until it was interrupted. Similarly the Discursive Episode begins when the interpretation is interrupted and ends when it restarts (or when another Standard Activity starts). The discursive Episodes may in turn be broken down into each of the cycles shaping this verbal interaction, in keeping with the model proposed by Sánchez et al. (2008). At this level of analysis a more micro description would be made of the interaction sequences.

Table 1 Typical activities involved in the teaching and learning of instrumental music activities. López-Íñiguez and Pozo (2016) (Reprinted with permission from Elsevier)

Category	Definition	Examples
Warm-up/tuning up	All activities aimed at getting the body and instrument ready and energised for class work (beginning to play/sing)	Tune the instrument Warm up with scales or warm-up exercises for each instrument or for the voice in the case of choral music
Instrumental musical production or interpretation	Student or teacher production through an instrument or the voice	Interpretation of scales, of a composition or part of it Interpretations using additional resources (clapping humming, singing, rhythmic beats, etc.)
Symbolic production	Oral, gestural or written productions, which accompany or refer to the interpretation or to the warm-up/tuning	Student and/or teacher verbalisations which accompany the musical production as it is produced Student and/or teacher verbalisations which evaluate or refer to the musical production after or before it Body movements or gestures of the teacher which accompany the musical production and may be interpreted as corrections, instructions, motivational aids, etc. Body movements or gestures of the teacher which accompany the musical production and provide information on the production Body movements or gestures of the teacher or the students prior to the musical production or following it Written reports which serve as instructions or evaluations of a musical production
Activities without musical content	Verbal or gestural activities which are unrelated to the class content or the musical content	Other types of digression Pauses to rest or relax

4.2 Dimensions and Components of the Analysis System

As stated, we understand that analysis of practice must be multidimensional in its nature, so that different components may be identified and their relationships may also be described or interpreted. From the distinction established by Sánchez et al. (2008) between *what is done, how it is done* and *who does it*, SAPEA assumes,

from Pozo (2008), that in all instructional activity or practice there are at least three components connected to these three questions which we must respond to: results, processes and conditions (see chapter "The Psychology of Learning Music").

In our case then, the *how it is done* would be broken down into two components: the interactions and aids that are measured in learning and the cognitive and metacognitive processes which the student puts into effect. Moreover, unlike the proposal by Sánchez et al. (2008) one of our hypotheses would be the close interdependence between these three components since they would form an integrated system but with different degrees of coherence (Pozo, 2008; Pozo et al., 2006). Similarly to the studies by Sánchez et al. (2008), the distinction between these three analysis components would enable their relationships to be empirically contrasted, although in our case we would foresee interdependence between these components. For each of these dimensions it is necessary to also develop specific analysis categories or dimensions, and the most precise as possible indicators for each of them, which are presented below.[2]

4.3 The Results of Learning

An initial classification of these results would begin with the distinction between *symbolic, procedural* and *attitudinal* learning, established in chapter "The Psychology of Learning Music". These three types of results could be observed both in verbal and instrumental episodes. Equally, the same episode could work on different results in a related or simply juxtapositioned manner.

Symbolic Learning (Verbal)

This would correspond to the mastery of languages and codes of musical representation, particularly to sheet music, differentiating between several levels of processing (Bautista & Pérez-Echeverría, 2008; Casas & Pozo, 2008; Marín et al., 2012; Marín et al., 2013a) from the differentiation established by Postigo and Pozo (1998) between the explicit, implicit and conceptual processing of external representations (see also Pérez-Echeverría et al., 2010; Martí & Pozo, 2010; Pérez-Echeverría & Scheuer, 2009). In the case of musical notation learning, these three levels of increasingly complex processing, as explained in detail in chapter "Reading Music: The Use of Scores in Music Learning and Teaching", would be:

(1) *Notational* (corresponding to the explicit marks or notations in the musical score, such as notes, rhythms, fingering, etc.). For example, in a classroom of any string instrument a teacher could say "*in this bit of the song there are little clues for you, numbers*" [referring to the fingering].

[2] All of the examples which illustrate the different dimensions were taken from the before-mentioned research studies.

(2) *Syntactic* (corresponding to the implicit information in the musical score), which would be divided into two (see Table 2):

(a) The actual syntax (harmony, melody, scales, arpeggios, etc) so that in a string instrument class the following dialogue could occur:

– Teacher: *What chord do we play this melody in?* [Pointing to the musical score]
– Student: *Well on the bear string and, no, wait, yes, on the mummy string* [talks whilst playing the complete passage with pizzicatos]

(b) The analytical-structural (which involves a structure analysis or more overall organisational guidelines in the musical score). In this sublevel, we may find ourselves, for example, in a rehearsal of brass instruments with the following situation:

– Trumpeter: OK, I'm lost.
– Trombonist: In the four bars that you do on your own, what do you do? I mean, do you go in on a cadence?

(3) *Referential* (corresponding to the conceptual relationship of the composition with its production and interpretation context, considering expressive, communicative, historic elements, etc.). A situation at this level could be that of a musician in a rehearsal saying:

> OK, in the first chord, ¿What note shall we use? An E natural, isn't it? A D sharp? so it is A major, let's see if we can tune it in.

As demonstrated in previous studies (among others Bautista et al., 2009; Casas-Mas et al., 2015a; Marín et al., 2012; Pérez-Echeverría, 2017), the more complex levels (syntactic and referential) are usually associated with conceptions of more complex musical learning, at least interpretative if not constructive whilst the teachers and students most oriented towards reproductive learning, close to direct conceptions and practices, tend to reduce the processing of the musical score to decoding of their more explicit notational components (see chapters "Reading Music: The Use of Scores in Music Learning and Teaching", "The Impact of Teaching Conceptions and Practices in Early Musical Instrument Learning" and "Learning Outside the Music Classroom: From Informal to Formal Learning as Musical Learning Cultures").

Similarly, within symbolic result learning, identification could be made of those components related to the literal content learning of a piece. In the case of direct or more traditional practices resources requiring memorizing would be used, compared with more comprehensive or significant learning which is characteristic of constructive teaching. This would require linking parts of the same content to one another and then these in turn to other works or musical material external to the piece being learned. Again, literal learning tends to be more associated with direct or reproductive conceptions whilst a learning aimed at comprehension is characteristic of more constructive focuses (Bautista et al., 2009; Casas-Mas et al., 2015b; Marín et al., 2013a).

Table 2 Categories of analysis of symbolic learning in SAPEA, based on the levels of comprehension of musical scores (see chapter "Reading Music: The Use of Scores in Music Learning and Teaching"). López-Íñiguez and Pozo (2016) (Reprinted with permission from Elsevier)

Category	Definition	Example
Notational	Teacher or student verbalisations where the main objective is to learn, decode or practice the symbols or explicit graphic marks of the musical score, and to add other basic marks	Read the notes of the musical score (and their corresponding activity) Produce the rhythm that the musical score indicates Insert bowings and fingering Dynamics Reading of the chords as mere decoding of graphic symbols (in American jazz terms, the *basso continuo* in the baroque period)
Syntactic	**Syntactic sublevel** Teacher or student verbalisations and activities about any term which in itself requires a syntactic processing of the musical score: melody, accompaniment, modality, tonality, motive, theme, phrases, voices, etc.	View the composition harmony in a functional way, relationships between chords (e.g., II–IV, 6♭) Play the arpeggios of the piece Be aware of the composition key
	Analytical-structural sublevel Teacher and student verbalisations and activities which involve relating several notational and/or syntactic elements of the musical score that result in a new element with its own entity. This also refers to the structural, melodic and general harmonic analysis of the piece	See the changes in harmony and their relationship with the themes Harmonic, melodic, formal, textual analysis, etc., without this affecting other parameters
Referential	Relationship of the composition elements which belong to the previous levels with their communicative, aesthetic, stylistic, expressive, semantic, perceptive and psychological dimensions	Express the composer's idea of the piece to the audience Invent a story to help express the music that is being learned Understand the meaning of the musical score, its style and aesthetics

Procedural Learning

This concerns knowing how to do it, not knowing what to say. Differentiation may firstly be made between motor or psychomotor procedures aimed at learning instrumental technique and body control. As a result, cognitive actions and procedures (e.g., Lehmann et al., 2007; Williamon, 2004) related to mental processes could effectively be made and these would in turn regulate actions such as the production of sound, expressiveness or memory.

In the first psychomotor case, a choir director could say to the choir singers "*Listen to the piece whilst you move freely around the room, paying special attention to the changes in intensity and the variations of the melody*". Also, the following situation could occur in any instrumental classroom:

– Teacher: Now, do you see this secret mark there? That little bird? I told you at the beginning of summer that the little bird is a natural harmonic that you can find here [pointing to the fingerboard]. Now you can do it like this [with one finger specifically], and now the other [finger] pressing close to this other one [whilst they place the fingers of the student in the right place]. This other one is a bit more complicated, let's see how you do it.
– Teacher: Now we let our wings [arms] rest.
– Student: [humming and moving their body in a relaxed way]

Regarding the cognitive procedures relating to the expressive aspect, in a brass rehearsal this could be practised in the following way:

– Trumpeter: We should sound stronger in bar 33.
– Horn: But afterwards there is a very tragic strong note.
– Trumpeter: Yes, but that moment is sweet and intense.

We could also find teachers and learners of instruments commenting on issues such as:

– Teacher: "I'm going to lend you 20 records so that you really get into the Baroque style".
– Student: "I used to play like this [plays it], but the teacher wants it to sound like this [plays it differently], like dancing".

Memory resources could be reflected in a dialogue like the following:

– Teacher: Memorise the piece for the exam.
– Student: The best way to learn a piece by heart is dividing it first into sections and practicing them separately.
– Teacher: Can you play the piece without the musical score?
– Student: *Yes, I already know it* [plays the whole piece by heart]

In both cases, in keeping with the distinction established in chapter "The Psychology of Learning Music", we would be able to distinguish between more technical procedures, aimed at automated reproduction of action sequences that would be more common in direct didactic approaches and the more strategic ones either related to the use of techniques with specific expressive goals with metacognitive management of the actual learning processes (review of this subject in Bathgate et al., 2012; Concina, 2019), that usually appear in the framework of interpretative practices (under the teacher's supervision) or constructive practices (when it is the student who manages these procedures) (Table 3).

Attitudinal Learning

This refers to learning to know how to be and how to feel. The frequency and repetition of behaviour patterns in our daily lives lead to a series of attitudes which in turn build up values towards what surrounds us. This social learning allows us to

Table 3 Procedural learning analysis categories in SAPEA. López-Íñiguez and Pozo (2016) (Reprinted with permission from Elsevier)

Category	Definition	Examples
Psychomotor	Necessary motor contents for learning the musical score or the specific instrument technique	Any of the following terms and similar: tuning, technical exercises, first position, *detaché*, gestures, relaxation and body posture, breathing, agility and precision of fingers, bow mastery, hand coordination, etc. Passing from finger 1 to finger 2 Bow distribution Tuning the instrument at the beginning of the class Breathing before each phrase to relax the body Trying out different fingerings
Expressive	Interpretative-intuitive type contents where the notational or psychomotor elements that would have to be learned to acquire them are not specified, but which actually help us to aesthetically embellish these symbols and where holistic or referential types of comprehension are mentioned of the composer or the music that is learned	Use a faster *vibrato* in the long notes Phrasing with an idea of continuity Differences of character Understand the "spirit" of the piece Listen how the teacher plays and ensure the student understands the concept, the gist of it more or less Understand what the author who composed the piece wishes to say, what they wished to convey
Sound production	This refers to the specific work of searching for the appropriate sound or sounds that can be taken from the instrument, to adapt it to the technical-musical idea of the piece	
Memory resources	All those procedures (both mechanical and strategic) which are related to the faithful reproduction of the piece or a passage of it, without using external memory, paper or audio tools	References to any type of memory (working memory, muscle memory etc.)

develop an identity, which becomes our social calling card that changes throughout our development depending on how our beliefs evolve. Attitudes and values towards music and its learning are promoted by learning and teaching. The foremost among these is the training of an approach to the so-called "stage presence". Learning this stage profile implies attention to aesthetic ideas and skills for performance as well as the implicit or explicit development of an attitude towards the audience, which is by no means always successful.

Table 4 Attitudinal learning analysis category in the SAPEA. López-Íñiguez and Pozo (2016) (Reprinted with permission from Elsevier)

Category	Definition	Examples
Stage presence	Public performance preparation contents, such as sequences of action, verbalisations and self-instructions in anticipation of interpretation	– Student: *I'm going to be calm, I'm going to be calm* – Teacher: *You go out that side and greet in the centre* – Teacher: *Let's practice bowing to the audience in the mirror* – Student: *I sit down on the stool and before I begin to play I imagine the music to relax myself and detach myself from the music stand*

This critical learning may overshadow a large quantity of potential skills and important aesthetic ideas. In music education and research institutions there has been an upsurge in recent years for the gradual and deliberate incorporation of preparation for public performance. For example, an awareness has been made of the beliefs, sequences of actions, verbalisations and self-instructions in anticipation of performance (e.g., González et al., 2018; or also see, for example, the research projects on improvement of interpretation in the *Centre for Performance Science* in the United Kingdom[3]; or the online teaching initiative[4] of teachers from Finland, United Kingdom, Holland and Australia where they offer free resources in this respect for students of musical instruments in higher education). From our theoretical focus and our research, we know that children exposed to the more traditional teaching models appear not to pay much attention to this aspect, whilst those who belong to constructive models do usually indicate that preparation for facing an audience and the communication of expressive ideas to the listener is important (see the card activity with children in chapter "The Impact of Teaching Conceptions and Practices in Early Musical Instrument Learning") (Table 4).

4.4 The Learning Processes

This dimension refers to the management of the different processes that help to produce learning and that contribute to the different types of learning, either more repetitive or more significant. It therefore refers to procedures which seek the mobilisation of certain processes. Thus, for example, the demands of the teacher at a given time may encourage a student to learn repetitively and aim at syntactic comprehension from a musical score or at other levels. There's a difference between asking a student to have learnt the scale of F major and bringing it to class to asking them to recognize it or how it is used as a harmonic transition in any movement of a sonata.

[3] https://performancescience.ac.uk.

[4] http://web.uniarts.fi/practicingtipsformusicians/index.html.

As studies prior to those of our group have shown (e.g., Bautista et al., 2010; Casas-Mas et al., 2015a; López-Íñiguez & Pozo, 2014; Marín et al., 2013b; Torrado & Pozo, 2008), teachers and students with closer conceptions to a constructivist focus tend to attach greater importance to cognitive and metacognitive processes gained from learning, whilst those which adopt closer models to a traditional focus (associative or reproductive) focus mainly on results.

However, with greater or lesser frequency, many references to processes the student should activate in order to achieve fixed learning goals (see chapter "The Psychology of Learning Music") are produced in all class interactions. Thus, reference may be made to the mediation of more cognitive (Table 5) or motivational and emotional type processes (Table 6).

Regarding cognitive processes, as analysed in chapter "The Psychology of Learning Music", references are usually made regarding how to manage information recovery, to the actual processes of learning that should be used (either repetitive or comprehension directed), to how to manage attention, the use of different types of mental representations (auditory, visual, corporal, etc.) and to the actual metacognitive management of these processes to achieve the foreseeable goals, in terms of planning (see definitions and examples in Table 5). The frequency with which reference is made to these different processes, and to the nature of the same, is usually indicative of different conceptions and practices of learning and teaching (Baño, 2018; Casas-Mas et al., 2015a; Corbalán et al., submitted; López-Íñiguez & Pozo, 2016, submitted; see also chapters "The Impact of Teaching Conceptions and Practices in Early Musical Instrument Learning", "Instrument Mastery Through Expression: The Learning of Instrumental Technique", "Learning Music by Composing: Redescribing Expressive Goals on Writing Them", "The Choir Conductor: Interpreter or Maestro?" and "Learning Outside the Music Classroom: From Informal to Formal Learning as Musical Learning Cultures" of the book for further examples). Thus, as we have seen, from a more direct focus (in keeping with the taxonomy established in chapter "How Teachers and Students Envisage Music Education: Towards Changing Mentalities"), identified with a type of ingenuous conductism (Pozo et al., 2006) less reference is generally made to mediator cognitive processes and when they appear, they refer mainly to associative forms of learning (literal recovery, repetitive learning based on blind practice and revision). However, with the interpretative focus greater reference is made to cognitive processes, even of higher complexity, which are not only aimed at associative learning but at some forms of constructive learning. Notwithstanding, the regulation of these processes—who mentions them and who manages them—is up to the teacher alone. Finally, from a constructive practice, greater emphasis is placed on the student to manage and regulate their cognitive processes, which are also mainly aimed at more complex forms of learning (recovery with transference, comprehension, planning, use of many different representational formats, etc.; see references and previously mentioned chapters).

Motivational and emotional processes (see Table 6) follow a similar pattern. They are closely linked to the evaluation and interpretation of right and wrong acts. In this case, however, there is a clear presence of references to motivation and attributions, even in the direct conception, although they are usually clearly directed

Table 5 Categories of cognitive process analysis in the SAPEA. López-Íñiguez and Pozo (2016) (Reprinted with permission from Elsevier)

Category	Definition	Examples
Literal retrieval	Verbalizations or gestures from the teacher or student where previously learned knowledge is requested or alluded to	– Teacher: *Let's now look at the scale of F major which we studied last week* – Teacher: *Do you remember the melody we played at the beginning of the class? Let's see if you remember it all* – Teacher: *Does this sound familiar?* – Student: *I remember a bit of the song about the puppy, but only a bit* – Teacher: *You are completely right but I didn't want to tell you so that you would guess. It actually sounds the same as the puppy song* – Student: *This part is the same as in the other song (pointing to a passage in the score)*
Retrieval with transfer/activation and management of previous knowledge	Verbalizations or gestures from the teacher or student where knowledge which has already been acquired (past) is requested or alluded to so as to use as an anchor for a new learning (this may be more superficial or profound)	– Teacher: *Do you remember how you got the sound of E sharp in yesterday's song? Shall we see if it works for F as well?* – Teacher: *Imagine the wolf comes, let's see what he would sound like* – Student: *Why don't I try the same fingers 1–2-3 that appeared in yesterday's song?* – Teacher: *I'm going to give you a clue, what song is this one?* – Student: *The duck song* – Teacher: *Very good, how did you know?* – Student: *Well, I just thought what song has that silence and then I looked at the music and it is very similar. And then I realized* – Teacher: *Yes, that's exactly how it is done, first you realise what things they seem like and then you realise what other things are there. And that is how you learn*

(continued)

Table 5 (continued)

Category	Definition	Examples
Repetitive-revision learning	Verbalizations or gestures from the teacher or student which allude to the repetition of a musical fragment or motor skill action with or without the instrument to consolidate this learning	– Teacher: *We are going to repeat this 10 times* – Student: *I'm going to study this for 5 min every day* – Student: *The day before the concert I always study slowly, it's the only way it comes out right* – Trombonist: *We should repeat it again* – Tuba: *Let's repeat! Shall we do it da capo?*
Comprehensive learning	Verbalizations or gestures from the teacher or student, which promote the creation of knowledge and which cannot be included in any other category, e.g., prioritising, associating, comparing or selecting information	– Student: *In the breaths between question and answer I have to maintain the whole line of the phrase* – Student: *This type of attack is very different from all the previous ones because I have to hold my hand higher* – Teacher: "*What dynamics would you use in this passage?*" -Student: *If this were mezzo piano, I'm going to try to continue in piano and end in pianissimo* – Student: *Wait a second, one second, what does this mean?* – Teacher: *Think a little, what could it be?* – Student: *It's a zero* – Teacher: *And what does that mean?* – Student: [moves the fingers on the fingerboard, whilst thinking and counting fingers] *it means…* [touches the string in the air whilst the teacher corrects their position with the instrument] – Teacher: *Yes, that's where the E is* [the student plays the E correctly] – Student: *My teacher is one of the best teachers. She understands what I am thinking. She helps me if there is something I do not yet know how to do and during the classes I play better each time because I understand things*

(continued)

Table 5 (continued)

Category	Definition	Examples
Planning	Verbalizations from the teacher or student aimed at establishing a plan through which to organise the acquisition of a piece of knowledge	– Student: *I am going to study this to note down the best fingering for me* – Teacher: *First study the passage slowly and then do it faster until you are at the speed indicated by the score* – Tuba: *OK, before carrying on, just so it's clear, shall we cut at the beat or before?* – Trombonist: *At the beat*
Attention management	Verbalizations from the teacher or student which are related to focusing the attention and maintaining it through present and immediate actions	– Teacher: *Watch how you are moving your elbow* – Teacher/Student: *This is important because it might come into the exam* – The teacher points to some element in the musical score or any other item in the instrument – Teacher: *Can you clap this from here?* [pointing to the score of the puppy, touches her hand. The student plays while the teacher guides her through the score, when the student gets lost while reading the teacher makes funny faces]
Mental representation	Verbalizations from the teacher or student where activities are proposed in order to work or generate a mental, sonorous, tactile image regardless of whether it is related to a specific piece of music or sound or not	– Listen to the score internally – Visualise the piano keys with your eyes where the chords are – Do exercises just with your fingers, the same as with the piece, but without the instrument – Teacher: *Can we make the beginning sharper ?* [sings it] – Student: [plays it] – Teacher: *Can I ask you that every time this note appears the bow soars?* – Student: [plays it] Teacher: *Try it a bit sharper* [whistling]

Table 6 Categories of emotional process analysis in the SAPEA. López-Íñiguez and Pozo (2016) (Reprinted with permission from Elsevier)

Category	Definition	Examples
Extrinsic motivation management	Verbalizations or gestures through which the teacher, parents, colleagues (external agents) or students (internal agent) manage external elements to the learning process, that are used or serve to drive activity development	– Student: *I hate studying, but if my parents see me practising they will buy me trendy trainers* – Teacher: *Come on, do the scale again and we will play the duet you like so much*
Intrinsic motivation management	Verbalizations or gestures through which the teacher, parents, colleagues (external agents) or students (internal agent) manage internal elements to the learning process, that are used or serve to drive activity development	Personal challenges referring to the learning of a piece – Student: *I really like playing this piece from top to bottom, because it is so pretty* – Student: *I want to play this because it's really difficult to get right* – Student: *Why is there a 2 here?* – Teacher: *There are tricks, here and there, that's all I can tell you, there are tricks of the type you so like* [the student finds the correct fingerings whilst playing]. *Oh…*
(Positive and negative) Attributions	Verbalisation of the reasons the teacher or student attributes to the success or failure of learning in the activity undertaken (past), and which may be both positive or negative with regards to the individual (internal) or learning results, processes or conditions (external)	– Teacher: *I'm sure you have studied, but maybe not enough or you have not organized yourself well, how could you do it better?* Teacher: *although they have hardly studied at all its obvious they have talent and play well* *Student: the sound is very small because the acoustics are very different*
(Positive and negative) Assessment	Verbalisations of the teacher or student aimed at making a judgement on the action undertaken, which may—or may not—allude to the achievement—or lack of—of the objective at that time	– Teacher: *Now the passage has come out right* – Student: *Respecting the breathing spaces is something I haven't yet mastered* – Teacher/Student: *Good!* – Teacher: *You are playing it really well, this is much better*

at extrinsic motivation (maintaining efforts through rewards and punishments, see chapter "The Psychology of Learning Music") and to attributions which are more generally negative than positive. Given the importance of error correction in this direct or traditional conception (see chapters "Teaching Music: Old Traditions and New Approaches" and "The Psychology of Learning Music") it is highly frequent that this practice involves attributions and evaluations that focus more on errors and on negative aspects, which usually generate greater emotional tension in students (Austin & Vispoel, 1988; Hallam, 2009). These theories also make attributions to student conditions or traits, which are difficult for the student to change or control, such as talent. In contrast the adoption of an interpretative focus is the sign of an attempt to promote a good classroom environment, with more positive evaluations, focused often on explaining the reasons for error, not just correcting them. Finally, from a constructive stance more actions and verbalisations are made which are aimed at promoting intrinsic motivation and carrying out attributions to factors which can be controlled by the student, helping them take over control of their own learning and getting as close as possible to their own goals.

4.5 Teaching Conditions

In this analysis, the conditions refer to the type of teaching–learning activities that take place and to the participation of the different agents (teachers and students) in these activities—in short, who intervenes in these activities and how they do so. It is a question of identifying the different actions carried out by music teachers to manage their students' learning and the way in which they interact with them, giving rise to different participation structures. Depending on the interaction between all these conditions and the objectives involved, learning may be more associative or more interactive. For example, the first action in Table 7, informing, may be a condition for associative learning if it is carried out in an isolated or predominant manner and it is hoped that this is enough for the student to learn. However, if apart from informing, they also ask questions, argue, propose, etc. we may understand this would be a condition for significant or constructive learning. Although a great part of learning in instrumental music is supported in dyadic interactions, it is of particular interest to also analyse cooperative learning spaces (e.g., Baño, 2018; Gaunt & Westerlund, 2013; Vidal et al., 2010; see chapter "From Individual Learning to Cooperative Learning"), where several interpreters interact, by themselves or under the supervision of a teacher. From the different works which identify typical teaching activities (e.g., Coll & Solé, 1990; de la Cruz et al., 2006; Viladot et al., 2010), we would distinguish between the following types of actions:

But apart from observing the actions taken and their sequencing we are also interested in identifying the agents which fulfil them and the function they adopt in these didactic sequences. In this sense, Sánchez et al. (2008), who take as the unit of analysis the cycle from which episodes are composed, identify the three components of the already mentioned proposal by Cazden (1988): a teacher asks something which

Table 7 Categories for analysis of the conditions in the SAPEA. López-Íñiguez and Pozo (2016) (Reprinted with permission from Elsevier)

Action	Definition	Examples
Inform/transmit knowledge	Verbalisations of the teacher or student where basic knowledge is exposed	– Teacher/Student: *On a 4/4 beat there can be different notes: a round one, two white ones, four black …* – Horn: *Yes, it's asking me for another phrase too*
Respond	Verbalisations or musical interventions of the teacher or student where a positive or negative response is generated	– Teacher/Student: *is this an F?* – Teacher/Student: *I think so*
Explain/argue	Verbalisations of the teacher or student where an idea is justified	– Teacher/Student: *This phrasing is more appropriate because this one is a question and goes up to that note* – Trumpet player: *No, we should play more piano, but not lower the tempo because of it*
Correct	Verbalisations of the teacher or student where an execution or action considered inappropriate is made explicit. An alternative option may be given or not	– Teacher: *Don't lower your head whilst you are playing* – Teacher: *You made a mistake in that bit, it's A sharp*
Give instruction/orders	Verbalisations of the teacher or student through which the sets to follow to carry out an action are made explicit	– Teacher: *When you begin to study a musical score, before you play you look at the key signature and the beat* – Teacher: *Let's do a breathing exercise for this passage*
Model/demonstrate	Actions or verbalisations of the teacher or student which show an action which should be imitated	– Teacher: *Look, you have to put your finger like this, rounded* [making the gesture] – Teacher: *We're going to do a breathing exercise here. Breathe in and breathe out …* [whispering and demonstrating]. *Two, three…*
Ask/doubt	Verbalisations of the teacher or student which involve—or not—a response for the interlocutor, although the objective is that the interlocutor responds	– Teacher/Student: *What style does this piece belong to?, whose is it?* – Teacher: *What elements of this piece do you find striking?* – Student: *I don't know how to do this so that the piano is heard…* – Teacher: *How would you play this if you did not have any written harmonics?*

(continued)

Table 7 (continued)

Action	Definition	Examples
Propose/suggest	Verbalisations of the teacher or student where a possible action to be taken is made explicit tentatively or as an alternative	– Teacher: *Now try to play this in a different register* In a brass rehearsal: – Horn: *I think we should repeat it* – Tuba: *Shall we play it da capo?*

Table 8 Types of cycles in instrumental teaching and learning practice in the SAPEA. López-Íñiguez and Pozo (2016) (Reprinted with permission from Elsevier)

Open cycle	Response cycle	Evaluation cycle
The teacher or student suggests a certain activity is done which serves to close a certain cycle within an episode, without any evaluation or response being made. A question which is left in the air would also form part of the closure of this type of cycle – Teacher: *Well, let's play this other song…*	The teacher or student responds through verbalisations such as informing, responding, singing or playing, to some of the actions proposed by one of them (asking, ordering, suggesting…) without any evaluation being made and serving as closure to a certain cycle – Teacher: *Can you sing it?* – Student: *Do-Re-Do-Re-Re-Do-Do*	The teacher or student assesses or attributes (both positively and negatively) the success or failure of the activity carried out in a certain cycle – Teacher: *What do you think of this song?* – Student: *It's pretty. I can play it more or less* (whilst they play pizzicatos without any feeling and the teacher thinks)

the student should know (I = *enquiry*), a student responds (R = *response*) and the same teacher evaluates what has occurred (E = *evaluation*). As we saw previously, this structure is known as IRE (for its initials in Spanish) There are also more open patterns of activity such as IRF (F = *feedback*), or more symmetrical where both the student and the teacher could begin the cycle, respond or evaluate. From these patterns, as shown in Table 8, we have been able to identify in each of the episodes observed, three types of cycles, which would correspond to those of response or evaluation mentioned, but also a type of open cycle which would not necessarily have any type of closure or feedback, and which could be made by the teacher or the student, as appears below:

In the SAPEA this type of help and the way in which these practices are structured would be linked to the previously mentioned implicit theories (see chapter "How Teachers and Students Envisage Music Education: Towards Changing Mentalities"). In turn, these cycles would correspond to different teaching practices in the following manner:

- Direct teaching practices: the teacher says what they have to do, assesses or offers a (closed) response to the suggested need or problem [this would correspond to something such as an (I)RE) in Sánchez et al. (2008) terminology, where RE are made by the teacher]. In this pattern the predominant actions would be *transferring knowledge, giving instructions, ordering, moulding, correcting.*
- Interpretative teaching practices: the teacher provides aid, suggestions, proposals but closes the cycle with an evaluation or a response (an IRE). In this pattern together with some of the previous categories, the predominance of actions such as explaining or suggesting would be characteristic.
- Constructive teaching practices: rather than providing responses the teacher guides and helps the student to find their own responses and self assessment or leaves the cycle open. He or she questions more than responds (this would be closer to the

Table 9 Types of interaction identified in the different episodes in the SAPEA. López-Íñiguez and Pozo (2016) (Reprinted with permission from Elsevier)

Interaction	Definition
Teacher (P)	The teacher says what has to be done, giving the (closed) response to the need or problem that has arisen [this would correspond to something like an (I) RE) in the terminology of Sánchez et al. (2008), where RE is made by the teacher). *the teacher imposes heavy control, talking, arranging, communicating…*
Teacher–Student (Pa)	The teacher provides help, suggestions, proposals, but he or she closes the cycle (an IRE). *the teacher suggests, proposes…*
Teacher–Student (PA)	Rather than providing the answers the teacher guides and helps the student to find their own answers. He or she asks more than responds (this would be closer to the IRF or open participation structures or where the closure, in the cases of IRE, would be made by the student). *The teacher suggests, guides, control is shared …*
Student (A)	The teacher lets the student work, supporting him or her, at the most questioning, but not suggesting or providing answers. Maybe this would be relevant in the case of symmetrical structures. *the teacher leaves the students to their own devices…*
Student–Student (Aa)	A student provides help, suggestions, guides or responds to another
Student–Student (AA)	Instead of being a single directional information or help structure this is more two directional or multi directional if there are two students. Characterised by reciprocity between the students

IRF or to open participation structures or where the closure, when there is IRE, is made by the Student). Here the pattern should be different with a predominance of categories such as suggesting or asking by the teacher, even with the additional presence of explaining, but it is especially the student participations which should increase, with them discussing, doubting and correcting their own actions.

We divided interaction into different sections depending on who the participants are (see Table 9). Firstly, we identified the predominant interactions in musical instrument teaching, with dyadic classroom formats (1–1), i.e., teacher-student. In this interaction we distinguished different nuances in the importance of participation and management of processes, results and learning conditions establishing as predominant the structures of Teacher (P), Teacher-Student (Pa) and Teacher-Student (PA) described below (the structure of just predominant A is much less frequent in the case of formal music teaching, but we have included it to be able to identify exceptional cases).

5 Analysis of Practice as Resource for Changing Musical Education

The system of practice analysis we have just described seeks to be an exhaustive tool for the observation of most activities taking place in instrumental music classes. We believe it would be impossible for observation to be totally objective. The eyes with which we observe, and the tools we use are influenced by what captures the attention most or what we concentrate on most at each moment in time. In the SAPEA construction we have tried to contemplate the majority of situations which could occur in the instrumental teaching class as well as the relationships of these situations which are more or less directly observable with the processes and type of learning produced.

Our aim was not just to describe what happens in the classes, but mostly to better understand what happens in them, providing a theoretical meaning to what is observed. To this end, Table 10 is an attempt to present a summary of the characteristic traits of the musical learning and teaching practices in accordance with each of the conceptions described in chapter "How Teachers and Students Envisage Music Education: Towards Changing Mentalities".

It is important when interpreting the content of this summary table to bear in mind that the actions of a teacher and a student are not always aligned within the same conception or theory. This was already made clear in chapter "How Teachers and Students Envisage Music Education: Towards Changing Mentalities" relating to conceptions and is all the more so when real practices in the class are involved. Instead they respond to summaries or profiles which, in keeping with the principle of hierarchical integration mentioned in chapter "How Teachers and Students Envisage Music Education: Towards Changing Mentalities", embody several of these conceptions to a variable degree (Pozo, 2017; Pozo et al., 2016). Also, as reflected in Table 10, some of these traits have a continuity from a simpler conception to another more complex one (from left to right in the Table 10), which is reflected with continuous or discontinuous arrows. The same trait may appear in different conceptions with a similar frequency (continuous arrow) but also stay the same whilst considerably reducing their frequency or relevance (discontinuous arrow). In fact, as shown in chapter "How to Know and Analyse Conceptions on Learning and Teaching", the change of some theories or conceptions to others, in keeping with the principles which govern conceptual change (Pozo, 2014; Scheuer et al., 2006), are initially supported by a hierarchical integration, according to which new conceptions accept some of the traits of the previous theories, but redescribe them or reconstruct them, in this case in new practice structures.

Another major trait of the SAPEA which the Table 10 attempts to reflect is that one has to consider not just what is done but also who does it. It is not the same for processes to be managed by the teacher, or the student or that their management is combined. These different forms of managing activities are contained in the last row of the table.

Table 10 Characteristic traits of the practices of teaching and learning according to different conceptions (The continuous arrows indicate that this characteristic is maintained in the following conception; discontinuous arrows mean that although it may still appear, it is undertaken with less frequency and relevancy)

	Direct	**Interpretative**	**Constructive**
Results	– Notational – Syntactic – Psychomotor – Reproductive memory resources based on repetition Scenic presence focused on success	→ → – Analytical –structural → – Reproductive memory resources based on arbitrary relationships or not – Sound production →	- - - - - - → - - - - - - → – Referential – Expressive - - - - - - → – Activation of significant and relational memory - - - - - - → – Scenic presence for communication with the listener
Processes	In general little reference to processes, but when they appear they are always managed by the teacher – Literal retrieval – Repetitive-revision – Establishment of fixed action sequences, planning, as routines fixed by the teacher	Higher frequency of processes but usually managed by the teacher who invites the student to bear them in mind → → →	Greater emphasis on the processes and especially on self-regulation of them by the student - - - - - - → –Transformations and variations on what has been learned –Joints earch for new strategies and plans of action

(continued)

Table 10 (continued)

	– Attention management (by the teacher)	→	–Management of attention by the student
		– Retrieval with transference	→
		– Comprehensive learning	→
	– Extrinsic motivation largely based on penalisation of error	– Extrinsic motivation based more on gratification than on the penalisation of the error	– Intrinsic motivation – Higher frequency of positive assessment by the teacher.
	– Greater frequency of negative assessments (identification and correction of errors) rather than positive ones by the teacher, and also attributing them to the student.	– Both positive and negative assessments by the teacher	– When negatives appear more than for correcting errors they are managed so as to promote reflection on what has happened
		– Both positive and negative attributions by the teacher	– Explicit use of different formats of mental images by the teacher
Conditions	– Giving instructions and orders	→	- - - - - →
	– Informing and conveying knowledge	→	- - - - - →
	– Modelling and demonstrating	→	- - - - - →
	– Responding	→	- - - - - →
	– Correcting	→	- - - - - →
		– Explain and argue	→
		– Propose, suggest	→
			– Ask – Doubt

(continued)

Table 10 (continued)

	– Open cycles of response and evaluation		– Open cycles, of response and evaluation – Emphasis on interaction between students – Promote situations of cooperation between students where they necessarily regulate their learning processes
Who takes decisions on it	**P:** The teacher says what has to be done, gives the answer (closed) to the need or problem proposed	**P y Pa:** The teacher provides help, suggestions, proposals, but he or she closes the cycle.	**Greater protagonism of the student in taking decisions and actions:** **PA:** guides and helps the student to find their own answers **A:** the teacher lets the student act, supporting him or her, only asks, does not suggest nor provide answers **Aa:** A student provides help, suggestions, guides or responds to the another / **AA:** two-directional or multi-directional if there are more than two students. This is characterized by reciprocity between students.

In any event, Table 10 should be regarded as an ideal or prototypical characterisation of actions which both the teacher and the student undertake in an instrumental music class, according to the three positions previously mentioned (direct interpretative and constructive). However, as pointed out several pages ago, at the beginning of this chapter, practice is always richer than any model attempting to contain it (including of course the SAPEA, however exhaustive it purports to be), and the use of this system for analyzing specific practices usually leads to more complex, varied and infinitely richer patterns than those reflected in it.

In addition to this attempt at thoroughness and the provision of theoretical meaning to teacher and student practices for a better understanding of them, we have tried to make SAPEA a versatile tool that can adapt to different circumstances. We believe it is therefore a living and alterable tool which must adapt to the objectives and people using it but also to the characteristics of the instrument that is being learned or the circumstances and conditions of the classroom and the students. As may be seen in the following chapters, it is not the same to observe the dyadic interaction in a beginner's cello class (see chapter "The Impact of Teaching Conceptions and Practices in Early Musical Instrument Learning"), as that of a choral class where there is a teacher-conductor and several students (see chapter "The Choir Conductor: Interpreter or Maestro?") or the analysis of informal learning spaces (see chapter "Learning Outside the Music Classroom: From Informal to Formal Learning as Musical Learning Cultures"). The works upon which these chapters (and many other chapters in Part Two of the book) have been based are supported by the SAPEA, but the categories used in each case may vary in keeping with the actual conditions and the direct observation objectives.

SAPEA therefore seeks to offer a structure which will be used differently, depending on characteristics and objectives and where categories used may be selected and new categories may be introduced. However, this versatility means that the tool may also be used with different objectives. As shown in the following chapters, it is a valid tool for research on learning and teaching of instrumental and vocal music. Furthermore, with this common but versatile structure we are able to compare results which in other situations using different tools would be impossible without falling into an inferential, and at times not well justified practice. We believe this tool may also be useful in innovation spaces, in educational change where a teacher analyses his or her own practices to improve them. So too in teacher training spaces. Practices are undoubtedly essential tools during initial teacher training or continuous professional training and they should include knowing what to say and knowing what to do (Martín & Cervi, 2006). The same occurs with the observation of practices undertaken by others. However, as underlined in chapter "Instrumentalist Teacher Training: Fostering the Change Towards Student-Centered Practices in the 21st Century", these practices serve for very little if they are not combined with reflexive processes that foster comprehension of what is happening at each moment. It is SAPEA's aim to accomplish this reflection.

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