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Didactic transposition in music education: Exploring didactical suitability in three Navarrese schools

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Abstract

Didactic transposition occurs when scholarly knowledge is transformed into knowledge to be taught in order to reach didactical suitability. In this study, we explore didactic transposition implemented in music lessons from the perspective of didactical suitability. Utilising Design-Based Research, the current study collected qualitative and quantitative data from three urban schools in the Chartered Community of Navarre, Spain. Findings reveal that didactic transposition depends on the teacher's beliefs because, while one-to-one teaching and academicism are preferred by educators who prioritise music theory, collective teaching and creativity are promoted by teachers who favour holistic development. In conclusion, didactic transposition enables the aspiration to didactical

suitability, explaining the characteristics of didactic contracts. Lastly, some pedagogical implications are provided.

Keywords: basic didactic positions, didactic contract, pedagogical content knowledge, teaching styles, holistic architecture, DBR.

Resumen

La transposición didáctica se produce cuando el conocimiento académico se transforma en conocimiento a enseñar con el fin de alcanzar la idoneidad didáctica. En este estudio, exploramos la transposición didáctica implementada en las clases de música desde la perspectiva de la idoneidad didáctica. Utilizando la Investigación Basada en el Diseño, el presente estudio recogió datos cualitativos y cuantitativos de tres escuelas urbanas de la Comunidad Foral de Navarra, España. Los resultados revelan que la transposición didáctica depende de las creencias del profesor porque, mientras que la enseñanza individualizada y el academicismo son preferidos por los educadores que priorizan la teoría musical, la enseñanza colectiva y la creatividad son promovidas por los profesores que favorecen el desarrollo holístico. En conclusión, la transposición didáctica permite aspirar a la idoneidad didáctica, explicando las características de los contratos didácticos. Por último, se ofrecen algunas implicaciones pedagógicas.

Palabras clave: posiciones didácticas básicas, contrato didáctico, conocimiento pedagógico del contenido, estilos de enseñanza, arquitectura holística, IBD.

Résumé

La transposition didactique se produit lorsque des connaissances savantes sont transformées en connaissances à enseigner afin d’atteindre l’adéquation didactique. Dans

cette étude, nous explorons la transposition didactique mise en œuvre dans les cours de musique du point de vue de l'adéquation didactique. En utilisant l'ingénierie didactique, cette recherche a recueilli des données qualitatives et quantitatives dans trois écoles urbaines de la Communauté de Navarre, en Espagne. Les résultats révèlent que la transposition didactique dépend des convictions de l'enseignant car, alors que l'enseignement individuel et l'académisme sont privilégiés par les éducateurs qui donnent la priorité à la théorie musicale, l'enseignement collectif et la créativité sont promus par les enseignants qui favorisent le développement holistique. En conclusion, la transposition didactique permet d'aspirer à l'adéquation didactique, par le biais de l'explication des caractéristiques des contrats didactiques. Finalement, quelques implications pédagogiques sont fournies.

Mots-clefs: positions didactiques de base, contrat didactique, connaissance du contenu pédagogique, styles d'enseignement, architecture holistique, ingénierie didactique.

Introduction

Didactic transposition occurs when *scholarly knowledge* is transformed into *knowledge to be taught* in order to make it suitable for didactical situations (Chevallard, 1997). So, it is closely linked to pedagogical tasks because it is applied in the design and implementation of curricula, teaching methods, and learning activities. According to Chevallard and Bosch (2020), didactic transposition implies that the scholarly knowledge internalised by any professional is transformed into knowledge to be taught, which is required by a person or group of people to acquire and develop specific competencies in a particular field, even when those learners do not desire to become professionals.

Music teachers are responsible for didactic transposition, having to choose their teaching styles carefully because the profile of learners is a determinant for reaching didactical suitability in classroom settings (Biesta & Miedema, 2002; López-Íñiguez & Pozo, 2014). For instance, a quaver is scholarly knowledge but is taught differently in primary and professional education contexts. Hence, we do not try contrasting or promoting one teaching style over another because their differences can be seen quickly, and there is a place for each one. Our position is that any teaching style will be appraised according to the educational context, serving didactic transposition as an analytical resource for evaluating didactical interactions. In this regard, teacher beliefs play a decisive role because musical knowledge is taught in conformity with the pedagogical criteria constructed by each teacher, considering the educational context and supposed suitability of didactic transposition (Biasutti & Concina, 2018; Cain, 2013).

In this study, the general objective seeks to explore the didactic transposition implemented in music lessons of primary schools in a particular Spanish region because, even though music education is included as an elective subject in Spanish education policy, it is imparted compulsorily due to this region's regulations (Belletich et al., 2016). That is, all primary students participate in music lessons in this region, in conformity with the three core curriculum areas established by the national policy (MECD, 2014): 1) *Listening*, which implies understanding music emotionally and critically; 2) *Interpretation*, which encompasses performance skills in singing and instrumental playing, in both an individual and collective way; and 3) *Dance and Movement*, which is centred on embodied expression. Having noted this, we have established the following research question: How does didactic transposition explain didactical interactions in primary education contexts?

Didactic transposition and music education

Music didactics is understood as "the scientific study of all the factors that affect music education and its content" (Georgii-Hemming & Lilliedahl, 2014, p. 134), both in theoretical and practical terms, providing "teachers with an orientational guide for their activities in classroom practice" (Jank, 2014, p. 114). So, this implies that the knowledge is both taught and learned, focusing pedagogical content knowledge on didactical suitability (cf. Godino et al., 2007; Shulman, 1986).

The notion of *didactical suitability* implies evaluating the didactic process in terms of four dimensions (Godino et al., 2005; Godino et al., 2006). First, *epistemic suitability* evaluates the quality of the supplies, teaching processes, and epistemological meanings that are put into play in the didactic process itself. Second, *ecological suitability* appraises the teaching planning and delivery quality, considering the required conditions and provisions to carry it out. Thirdly, *cognitive-affective suitability* evaluates the relevance of students' prior knowledge for acquiring and developing new knowledge, considering both capacities of understanding and the degree of engagement in the didactic activity. Finally, *instructional-mediational suitability* appraises the capacity of the educator to discern what is pertinent in the instructional process, considering both teaching methods and the distribution of activities in time.

Didactical suitability becomes determinant, as it makes it possible to avoid the teaching of unvalidated knowledge or knowledge of little academic consensus, emphasising relevant milestones and skills from a stance that summarises an amount of information, economising details (Gomez, 2005). Hence pedagogical content knowledge is the most relevant knowledge or skill that a music teacher can attain (Grieser &

Hendricks, 2018), as it is understood as "knowledge of music teaching techniques, engaging students with music in a meaningful way, implementing the music curriculum effectively, assessing students' abilities in the various aspects of music, explaining and demonstrating musical concepts" (Ballantyne & Packer, 2004, p. 302). In other words, epistemic suitability is realised through musical concepts, ecological suitability is expressed through curriculum implementation, cognitive-affective suitability is represented by student engagement, and instructional-mediational suitability comprises pedagogical tasks for teaching and assessing.

From an anthropological approach, didactic transposition is understood as a set of research knowledge adaptive processes for teaching, transforming the scholarly knowledge into knowledge to be taught (Chevallard, 1997). Or rather, scholarly knowledge is recontextualised or reshaped because knowledge reproduction becomes more relevant than the production of knowledge (Bernstein, 2000). So, knowledge to be taught may be seen as pedagogical content knowledge because both concepts refer to the teaching of information or skills. The didactic triangle comprised of a teacher, a student, and knowledge (cf. Lilliedahl, 2015) is extended to a network of didactical interactions (Angel-Alvarado, 2018a) because environmental conditions also have an influence on the knowledge teaching and didactical suitability. Thus, didactic transposition embraces the notion of a *didactic contract* (cf. Brousseau, 1997) because it serves to interpret the commitments, sanctions, and common expectations established within didactical situations (Bolondi et al., 2018). Therefore, the teaching style implicitly reflects the didactic contract, as it determines through the hidden curriculum the way of interaction among the learner with the knowledge and the context.

The didactic contract should be changeable or flexible, gradually fostering learner autonomy over time through the progressive elimination of behavioural restrictions (Godino et al., 2009). So, didactic transposition may be understood concurrently from an epistemological facet linked to scholarly knowledge and an ecological facet related to knowledge to be taught, because scholarly knowledge must become suitable for learners, in the pursuit of didactical suitability (Godino et al., 2007; Gomez, 2005). In music education, both facets are simultaneously represented by scientific and practical sources of musicology and educational sciences because both possess cultural meaning (Angel-Alvarado et al., 2019; Schneuwly & Vollmer, 2018). Hence these sources are expressed through forms of discourse, such as aesthetics, idiosyncrasy, world view, history, or upbringing (Beard & Gloag, 2016; Hooper, 2016). Therefore, the epistemological and ecological facets of didactic transposition hold meaning in music education when the knowledge to be taught is centred on listening, musical expression, or creative thinking (Swanwick, 2016), as these actions can be defined culturally both by musicological and educational sources.

Both facets are coherent with the four basic didactic positions proposed by Nielsen (2007). First, *basic subject didactics* encompass knowledge to be taught according to the official curriculum, which educational agencies and governmental offices can establish. Second, *ethno-didactics* consider as knowledge to be taught any cultural element belonging to the implied local community, such that it is seen from a micro-cultural approach. Third, *challenge didactics* take transcultural elements based on globalisation as knowledge to be taught, so it is seen from a macro-cultural approach. Finally, the fourth position is *philosophical anthropological didactics*, which seek to intertwine emotions and logic.

Hence, knowledge to be taught is centred on self-reflexivity because the learner reflects on self from personal experiences lived within the social world (Väkevä & Westerlund, 2007).

The simultaneous presence of epistemological and ecological facets in every basic didactic position ratifies the existence of a network of didactical interactions in classroom settings, as knowledge to be taught has to interact with a teacher, a learner, and classmates, and other external factors linked to micro- and macro-environmental variables (Figure 1; Angel-Alvarado et al., 2019). Students are not responsible for the influence of external factors in didactical situations. Still, those factors could have an impact on learning tasks because, for instance, budgetary and curricular cutbacks are seen as a threat to equal opportunities for access to music learning (Burland, 2020). Teachers must be aware that the network of didactical interactions is affected by external factors to the didactical situation, which can be linked to matters of the school budget, policy making, the market, educational offering, and standardisation culture (Angel-Alvarado et al., 2020; Spruce, 2017). Even when educators can take an activist role in facing some of these external factors (Hess, 2019), it is imperative first to understand what happens in didactical situations because teaching beliefs could disclose observable aspects of the didactic contract.

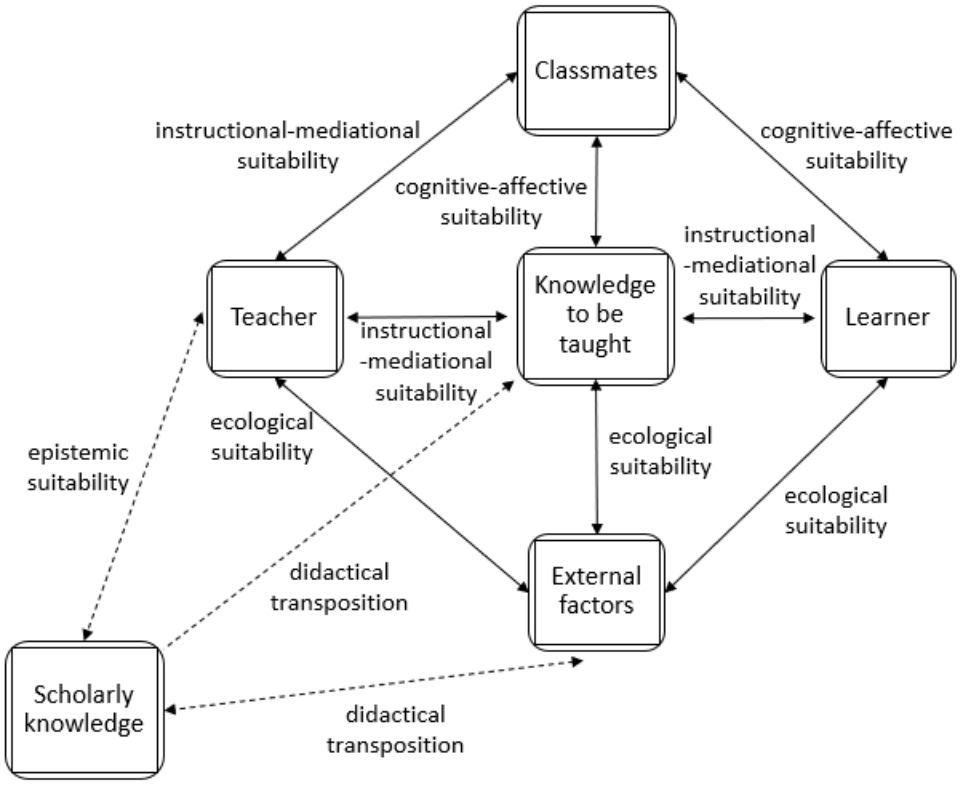

Figure 1. The network of didactical interactions in classroom settings.

Method

From Design-Based Research (DBR; cf. McKenney & Reeves, 2012), mixed research methods are applied in this cross-sectional study because the intertwining of qualitative and quantitative data enables the illustration of holistic findings through the construction of a portrait. DBR has been tailored to music teaching through the Holistic Architecture for Music Education (HAME; Angel-Alvarado et al., 2019), which was validated empirically by means of four basic didactic positions (Nielsen, 2014) due to a portrait founded on the network of didactical interactions has been illustrated (Angel-Alvarado, 2018a). Any illustration should represent a here-and-now of didactical situations (Westerlund, 2003), providing more credibility or validity to the findings (Barab, 2014; Hesse-Biber, 2010). It is worth saying that the sample size is irrelevant, as the internal

validity of the structural research design is displayed through the consistency between the empirical findings and the theoretical framework (McKenney & Reeves, 2012).

Given that HAME is a research design, various methods can be used for data analysis. Regarding qualitative data, the constant comparative method is applied because, through researchers' subjective experience, information is interpreted using characterizations of commonalities and dissimilarities (Carrero et al., 2012). Subsequently, those findings are triangulated with statistical data, applying SPSS to carry out nonparametric analysis procedures. Finally, triangulation enables the construction of a portrait concerning didactical suitability (Mertens & Hesse-Biber, 2012).

Sample

The sample comprises three sixth-grade music classes from three different schools. The class sizes vary between 22 and 24 students, with every school establishing a weekly teaching time of 45 minutes for music education. Having noted this, we have observed one music lesson of 45 minutes in every school. All schools have a music room equipped with a piano, sound system, Orff instrument set, projector, sheet music stands, and posters on musical instruments and notation. Besides, each learner has a soprano recorder and an exercise book. Regarding teacher profiles, we provide the following information per school:

- School 1: Teacher 1 is 50 years old, with 25 years of teaching experience and 21 years of teaching at the current school. He has a bachelor's degree in music and a master's degree in education.

- School 2: Teacher 2 is 39 years old, with 16 years of teaching experience, of which she has worked 11 at the current school. She has a bachelor's degree in music and a master's degree in music education.
- School 3: Teacher 3 is 38 years old, with 13 years of teaching experience, and having taught for 10 of those years at the current school. She has a bachelor's degree in music education and no postgraduate diploma.

Techniques for data collection

Three sources of data were used according to a criterion of methodological triangulation (Drouin et al., 2015), pursuing the common consistency among them. These materials are: 1) lessons observation; 2) a questionnaire for students; and 3) a semi-structured interview with the teacher. Further information is presented next:

Lessons observation. Field notes were used to record teaching practices. The focus of attention is centred on three aspects. First, tasks that have been carried out by students, making differences between one-to-one and collective teaching situations. Second, strategies for assessing music learning. Lastly, the delivery of immediate oral feedback to learners, considering key questions proposed by Fautley (2010), and five forms of support relationships (Angel-Alvarado et al., 2019): expert; inquiry; contextualised; consensual; and by petition.

Students' activity in music lessons. The Questionnaire for School Musical Activity (QSMA; Angel-Alvarado, 2018b) is applied in the Spanish language to identify musical activities carried out regularly by students in classroom settings. So, learners filled in it. The measure consists of 12 items (Table 1), which are distributed in four subscales (Table 1): listening; interpretation; embodied expression; and creativity. Every item starts with the

statement 'In lessons, my teacher proposes to me…'. These 12 items are rated on a five-point Likert-type scale ranging from 1 (never) to 5 (always).

Semi-structured interview with the teacher. A private interview of 10 questions was designed and divided into three sections. First, the teachers self-evaluate their teaching performance in the observed lesson (three questions, e.g., How do you self-evaluate your performance in the observed lesson?). Second, the teachers reflect on the appropriateness of the national curriculum for music (four questions, e.g., What do you think about the implementation of the national curriculum for music?). Finally, the third section encompasses the teaching profile of the educators (three questions, e.g., Why is it important to teach music at school?).

Table 1. Subscales and items from QSMA.

	Items in English (translation) In lessons, my teacher proposes to me…	Items in Spanish (original version) En clases, mi docente propone…
Listening	To explore our soundscape	Explorar nuestro entorno sonoro
	To listen to music from other periods of history	Escuchar música de otras épocas
	To listen to music from other countries	Escuchar música de otros países
Interpretation	To sing different songs	Cantar distintas canciones
	To play a musical instrument	Tocar un instrumento musical
	To play songs from our community	Interpretar canciones de nuestra comunidad
Embodied expression	To dance to music from other countries	Bailar música de otros países
	To dance to music from our community	Bailar música de nuestra comunidad
	To express musical ideas with our bodies	Expresar ideas musicales con nuestro cuerpo
Creativity	To create our music	Crear nuestra propia música
	To improvise music	Improvisar música
	To imitate the sounds of my environment	Imitar sonidos de nuestro entorno

Data collection procedures

The three schools received a formal invitation by email, which presented information about the research purpose in the sixth-grade music class, the rights and duties of participants, the commitment of data confidentiality in accordance with the ethical codes suggested by the European Commission (2013), and the duration of data collection. Each

principal shared the invitation with the respective group of teachers, such that every community decided to participate in the study. Music teachers contacted the research team to announce their favourable reply. The adults then proceeded to read and sign informed consent while the learners responded with their assent. During the observed lesson, the researcher wrote down notes from the back of the room without filming, taking pictures, nor establishing conversations with learners. At the end of the session, each music teacher gave their students a hard copy of the QSMA, reading the instructions and items together in a guided way. In total, 68 learners have filled out QSMA. Immediately after the lesson, the teachers participated in private interviews. Teacher 1 offered the most extended interview (32 minutes), while Teacher 2 gave the shortest interview (18 minutes). All the teachers authorised the voice recording of the interview for later transcription.

Data analysis procedures

The constant comparative method was used to analyse the teaching tasks (Carrero et al., 2012). Two conceptual categories were established deductively; one is focused on didactical similarities between music teachers, whereas the other is centred on didactical differences. These categories were analysed through open, axial, and selective coding procedures (San Martín, 2014). Concretely, data from observation were coded through the key questions of Fautley's vision (2010), and these were contrasted with narratives provided through the interview to appraise coherence between pedagogical actions and teacher beliefs.

Subsequently, these outcomes were triangulated with statistical data provided by the QSMA (Mellinger & Hanson, 2017), establishing a significance level of 95% ($\alpha = 0.05$). First, data were analysed through univariate statistics and, finally, the Mann-Whitney

U Test was applied because, as a nonparametric analysis procedure, it allowed observing statistical differences among the three sampling units of students (McMillan & Schumacher, 2012; Rosenthal, 2012). Students' answers were contrasted and triangulated with the information provided through interviews and observations, and the coherence of the perspectives was evaluated. The research findings rely on internal validity, which is expressed through an illustration or portrait.

Results

At the beginning of the lessons, the three music teachers provided information about the subject's syllabus, the aims of the session, and the assessment criteria. They used prior knowledge as a departure point for the teaching tasks. When the lessons were close to the end, two teachers had accomplished the learning aims, informing students about the achievement. Next, the three cases are described first, highlighting their similarities and differences. Later, the outcomes are analysed considering the answers provided by the students in the QSMA. At this point, we emphasize that the QSMA's Factor Analysis was executed through SPSS and AMOS, using the extraction method of maximum likelihood and the oblique rotation method of Promax (Brien et al., 2012). The following results were obtained:

- The Kaiser-Meyer-Olkin (KMO) is acceptable because the KMO coefficient of 0.69 is greater than 0.5 (Field, 2000; Hallam et al., 2012), observing a significant ρ-value in the Sphericity Test of Bartlett ($\rho < 0.000$).
- The total variance explained has identified four factors, explaining the 63% of the variance (Murillo & Martínez-Garrido, 2012).

- Factor loadings are greater than 0.3, so they display practical significance. According to Hair et al. (2014), those loadings are acceptable. Furthermore, the QSMA indicated a Cronbach Alpha coefficient of 0.76, which is acceptable because the internal consistency is greater than 0.70 (Davenport et al., 2015).
- Regarding the goodness of fit indices, comparison measures are weak, as the Incremental Fit Index and Comparative Fit Index are lower than 0.90. However, the Root Mean Squared Error Associated (RMSEA) is acceptable because the close fit of RMSEA is equal to 0.08 (ρ-close = 0.01; Aldous, 2019). Thus, it is accepted that the result is representative of reality, given that the RMSEA is acceptable and, therefore, the possibility that the observed differences are due to chance or an unforeseen external variable must be rejected.

Didactical similarities between music teachers

In the three observed cases, Interpretation was the cornerstone among the core areas (see Table 1) because the didactic contracts prioritised singing, instrument playing, and embodied expression, "considering mainly popular music from the mass media" (Teacher 2). For instance, Teacher 1 taught the class to play the song "Despacito" (by Erika Ender, Luis Fonsi, and Daddy Yankee) on the soprano recorder using sheet music. Subsequently, he encouraged psychomotor development and assimilation of the vocal technique for singing, leading the practice of a Spanish version of "Cups" by Anna Kendrick. In another example, Teacher 3 emulated the TV show The Voice, such that students were distributed in teams, each one choosing a pop song to perform musically and with choreography. It is worth saying that traditional music from the Spanish region is rarely included in didactical situations "because the time is limited, and it is impossible to do everything" (Teacher 3).

Didactical differences between music teachers

Both Teacher 1 and Teacher 2 conducted tasks linked to warm-ups, singing, soprano recorder performance, embodied expression, and listening to music. Nonetheless, they encouraged one-to-one teaching because the learners interacted mainly with the music and not with classmates. So, the teachers conveyed immediate oral feedback through expert support (Angel-Alvarado et al., 2019), as they offered corrections and ordered exercises so every learner could become aware and improve technical or performative problems. In this regard, Teacher 2 emphasised that "students are assessed one by one" because she needs to listen to everyone individually. Furthermore, both teachers encouraged processes of academisation for popular music since it is taught through classical stave notation (Holguín & Shifres, 2014). This academicist vision was confirmed in private interviews, as Teacher 1 highlighted that "music learning provides a variety of skills to avoid laughing when listening to opera, for instance," while Teacher 2 expressed that "music education serves to acquire basic notions of music theory, such that everybody is assessed under the same criteria, with no difference existing between those who need reinforcement lessons and those who are attending conservatoires."

Regarding Teacher 3, the teaching tasks were centred on performances presented by the student groups, who chose the songs, created choreography, and selected clothes. Thus, collective teaching is applied because the sense of community is strengthened by promoting conversations among learners and their teacher, providing suggestions for improving both their own musical performance and that of others. So, consensual support is encouraged because learners and the teacher are continuously negotiating (Angel-Alvarado et al., 2019). Such a communal and participative routine consolidates the

intertwining between creative, critical, and emotional thinking. Moreover, pop songs were learned by ear and imitation, which means that academisation was not the route for learning to perform popular music. It is worth saying that a network of didactical interactions is seen in this context because a student interacts actively with classmates, Teacher 3, and the music. In this regard, Teacher 3 expressed in the interview that "music theory can be a headache in this deeply structured world. Therefore, music education should foster holistic development, understanding it as a liberating activity. That is, learners should have chances to make their own decisions."

Student perspectives regarding teaching tasks in music education

Three cases display differences in the promotion of the core areas established by the national policy, according to data provided by students who filled in QSMA (Table 2). Concretely, Interpretation is the strongest area in School 1 according to the students. Nonetheless, Dance and Movement indicates a similar mean, although it has the highest degrees of dispersion among all the core areas. School 3 also reports that Interpretation is highly promoted through teaching tasks, but Listening reached an upper mean with lower degrees of dispersion. These findings are consistent with the didactic contracts proposed by each teacher. By contrast, learners reported that Interpretation is the least fostered area in School 2, observing lower degrees of dispersion than the other two core areas. At this point, it is important to add that Teacher 2 expressed that her "music lessons often start and finish with games," such that Dance and Movement encourages more significant learning than the other core areas in students. Additionally, data analysis shows that Creativity is the least fostered area in all the observed cases.

Table 2. Descriptive statistics of core areas, according to the output by schools.

		School 1	School 2	School 3
Listening	Mean	9.35	9	11.96
	Range	5	9	8
	Variance	1.96	6.21	4.86
	Standard Deviation	1.40	2.49	2.21
Interpretation	Mean	10.65	8.30	11.43
	Range	7	6	6
	Variance	2.69	1.90	3.26
	Standard Deviation	1.64	1.38	1.81
Dance and Movement	Mean	10.13	9.65	10.17
	Range	8	11	12
	Variance	5.85	9.60	7.36
	Standard Deviation	2.42	3.10	2.71
Creativity	Mean	6.88	7.60	8.22
	Range	11	12	11
	Variance	4.59	9.31	6.63
	Standard Deviation	2.13	3.05	2.57

Data collected through the QSMA.
Source: Own elaboration.

In the core area of Interpretation, the Mann–Whitney U Test demonstrates that students at School 1 and School 3 consider that their teachers prioritise this among all the core areas (Table 3). However, School 2 displays statistically significant differences with the other cases ($\rho < 0.05$) because, although Teacher 2 aimed to improve instrumental playing and music theory, she admitted that "learners understand music education as an irrelevant subject, which serves only for entertainment through musical games" and therefore placed greater emphasis on other aspects, a fact that the students expressed through QSMA.

Regarding Listening, School 1 and School 2 are statistically homogeneous ($\rho > 0.05$) because one-to-one teaching is applied in both cases. In contrast, School 3 indicates statistically significant differences with the other cases ($\rho < 0.05$) because students had the chance to discuss different songs proposed by themselves to elaborate their musical performances, revealing the implementation of collective teaching. In this regard, Listening

may be seen as a determinant core area because, according to Teacher 3, "the sociocultural levels and interests of students are crucial for favouring holistic development, even when the educator does not enjoy those songs."

Table 3. Mann–Whitney U test according to the teaching of core areas in participant schools.

		Asymp. Sig. (2-tailed)
Listening	School 1 → School 2	0.902
	School 1 → School 3	0.000
	School 2 → School 3	0.000
Interpretation	School 1 → School 2	0.000
	School 1 → School 3	0.088
	School 2 → School 3	0.000
Dance and Movement	School 1 → School 2	0.626
	School 1 → School 3	0.819
	School 2 → School 3	0.506
Creativity	School 1 → School 2	0.544
	School 1 → School 3	0.067
	School 2 → School 3	0.377

Source: Own elaboration

Finally, the results also indicated statistical homogeneity between the three cases in Dance and Movement ($\rho > 0.05$). These findings are coherent with the qualitative outcomes because the competencies related to embodied expression have assumed a purely functional role in ensuring the acquisition and development of performative competencies. Creativity also displays a statistical homogeneity between all cases ($\rho > 0.05$), such that the didactical situation applied in School 3 should be understood as an introduction or milestone to creative thinking and not as a routine activity.

Discussion and conclusions

All the participants use popular music as scholarly knowledge; however, it is transformed into knowledge to be taught in different ways. On the one hand, the use of sheet music as a learning resource is integral to the didactic contract of Teacher 1 and Teacher 2, such that popular music undergoes processes of academisation in contexts

where the didactic triangle and one-to-one teaching prevail (Angel-Alvarado, 2021; Carey et al., 2017; Lilliedahl, 2015). On the other hand, Teacher 3 proposes a didactic contract where popular music is learned by ear (Casas-Mas et al., 2014; Pacheco-Costa, 2019), applying collective teaching founded on the network of didactical interactions (Angel-Alvarado, 2018a; Green, 2017).

These didactic contracts reveal that didactic transposition depends on the teacher's beliefs about the intertwining between epistemic suitability and instructional-mediational suitability (Biasutti & Concina, 2018) because, while one-to-one teaching and academicism are preferred by educators who prioritise music theory through expert support (Holguín & Shifres, 2014), collective teaching and creativity are promoted by the teacher who favours holistic development through consensual support (Angel-Alvarado et al., 2019). Certainly, each music teacher has the academic freedom to make pedagogical decisions, but this does not mean that any music education may be seen as didactically suitable because the quality of music teaching is evaluated through contextual factors linked to didactical suitability.

It is interesting to discuss whether or not any one of these didactical situations can be seen as more suitable than the others, although it is imperative to consider that such discussion might perilously open the door to the definition of standardised teaching criteria (Godino et al., 2007). Our purpose is to preserve the anthropological approach promoted by Chevallard (1997), such that the objective of standardisation is rejected, at least when it does not allow an adaptation and intertwining between the epistemic, ecological, instructional-mediational, and cognitive-affective dimensions. Hence, we also distance ourselves from lines of research interested in validating statistical models for predicting music teacher's self-efficacy (Biasutti et al., 2020).

The anthropological approach encompasses didactic transposition's epistemological and ecological facets, pursuing didactical suitability through musicological and educational sources. In this regard, the three participants avoid transmitting unvalidated knowledge, summarising an amount of information (Gomez, 2005). However, only Teacher 3 applied the network of didactical interactions (Figure 2), as she is focused on musical expression, listening, and creativity, promoting learner autonomy and musical fluency (Swanwick, 2008; 2016).

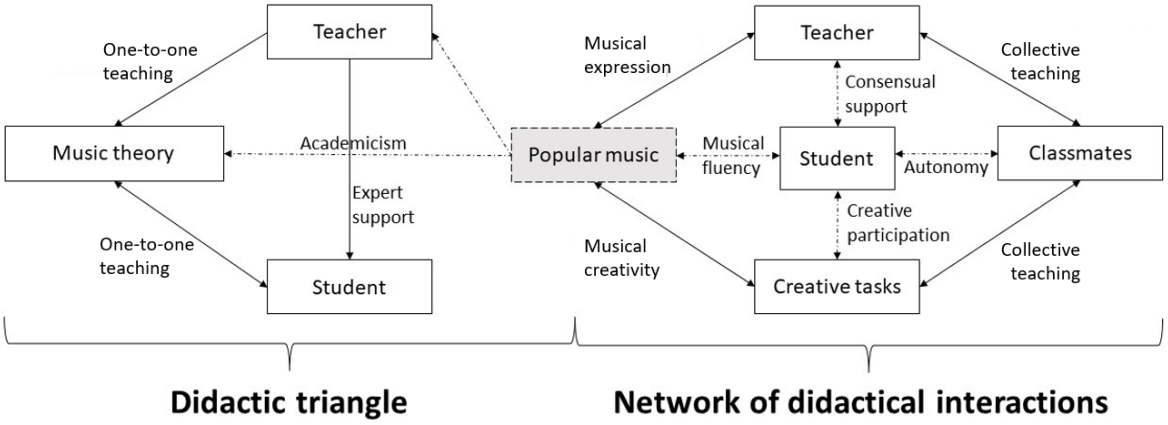

Figure 2. Comparison of didactic contracts.

More specifically, instructional-mediational suitability is processed collectively because all teaching tasks pursue co-participation in teams, which encourages cognitive-affective suitability, as each learner has to be intrinsically committed to the musical project (Green, 2017; Pozo et al., 2020). In this regard, epistemic suitability is oriented towards musical expression and creativity because scholarly knowledge is transformed into knowledge to be taught using re-creative and innovative tasks (Angel-Alvarado et al., 2022; Angel-Alvarado et al., 2023). It is worth saying that didactics are continuously negotiated with school communities due to the systematic enactment of educational policies,

requirements of school educational projects, and demands of students (Angel-Alvarado et al., 2020). Hence, ecological suitability displays that didactical situations are widely complex, making it imperative that music teachers have an adaptation capacity to get their tasks off the ground, being conscious of every agent's needs, requirements, and demands in the network of didactical interactions.

The other two teachers have presented instructions based on notation and didactic triangle, which poses three limitations. First, the development of autonomy is threatened because learners have no chance to prepare their own music projects within the didactical situations, which lessens the instructional-mediational suitability given that learners are pedagogically impeded from listening and choosing songs in lessons. Second, musical fluency is disregarded because the musical expression is corrected through music reading, overlooking aural activities. So, the didactical suitability declines in epistemic and cognitive-affective terms because the educational design is centred on music elements understanding, with engagement towards musical practice becoming less important. Last, creative thinking development is impeded because musical practice is restricted to the interpretation of sheet music. Hence, the didactical suitability declines in instructional-mediational and ecological terms because the teachers do not ensure conditions and provisions for carrying out activities linked to creativity.

Didactic transposition may also be observed in the four basic didactic positions (Nielsen, 2017), giving an account of another viewpoint regarding didactical suitability. Firstly, the participants' didactic contracts are consistent with basic subject didactics because the three core areas established by the national policy are encouraged in the didactical situations. Nonetheless, it is noteworthy that Listening is consciously intertwined

with musical and embodied expressions only in the tasks promoted by Teacher 3. The rest of the participants work first on Interpretation and later on Dance and Movement, such that Listening assumes a functional role in strengthening the other core areas. This calls epistemic suitability into question because learners have few opportunities to practice auditory discrimination or musical analysis. Hence, students could feel limited in discussing the meanings of music, as they would not necessarily recognize forms, progressions, textures, or even musical instruments aurally.

Secondly, none of the observed didactic contracts includes cultural elements of the Spanish region, so ethno-didactics are disregarded, negatively affecting ecological suitability. Third, the three participants teach popular music in didactical situations, displaying thus a pedagogical interest in encouraging transculturation and globalisation because they use mainly foreign music. So, transcultural factors affect ecological suitability, making instructional-mediational suitability directly questionable because the teaching methods prioritise cultural elements from globalisation, overlooking local knowledge systems.

Lastly, philosophical anthropological didactics are strengthened because all the didactic contracts foster the intertwining between emotions and logic, although the didactical situations display differences. Specifically, Teacher 3's learners think about their personal experiences as singers, musicians, dancers, creators, and listeners. In contrast, students in the other classes only think about their musical practices from the performers' perspective, which lessens the cognitive-affective suitability because the learning tasks mainly encourage cognitive processes and the emotional aspect is linked to isolation, as students tend to rehearse alone.

In conclusion, didactic transposition enables the aspiration to didactical suitability when basic didactic positions are considered (Nielsen, 2007). Certainly, this study has limitations, as the number of didactical situations can be seen as restricted, and information about performative musical skills from teachers is not provided. Despite this, didactic transposition has served at least for revealing and explaining the pedagogical characteristics of three primary education's didactic contracts from an anthropological approach, which has enabled technically to answer the research question and theoretically to propose that one fosters the development of more knowledge, skills, and attitudes than the others. More precisely, the more effective teaching practice promotes musical fluency, learner autonomy, and creative participation through tasks that simultaneously strengthen all core areas (Swanwick, 2008; 2016). Therefore, primary education students live personal and communal experiences as listeners, performers, and creators (Angel-Alvarado et al., 2022; Angel-Alvarado et al., 2023).

Three implications arise from these findings. Firstly, from a theoretical perspective, it would be useful to replicate this study to establish whether or not didactic transposition is observed in other educational environments. Indeed, it is pertinent to highlight that the outcomes of DBR should be grounded theoretically, contrasted empirically, and replicable. Secondly, from a practical perspective, it is appropriate to orient pedagogical content knowledge towards didactic transposition in order to seek didactical suitability, taking the network of didactical interactions into account because the context has an impact on didactical situations, both by internal and external factors. Finally, the pedagogical perspective emphasises that music teachers must design their didactic contracts carefully, as didactical suitability is essential to comply with the proposed learning goals in a specific

context. It is imperative to understand that the didactic contract may be modified, as it should be tailored gradually toward learner autonomy, progressively reducing behavioural restrictions. In short, there are no 'good' or 'bad' contracts, but 'well' or 'badly' adapted to learning and teaching conditions in the different dimensions involved: epistemic, ecological, instructional-mediational, or cognitive-affective.

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References

Aldous, C. (2019). *Unlocking creativity in solving novel mathematics problems: Cognitive and non-cognitive perspectives and approaches.* Routledge.

Angel-Alvarado, R. (2018a). *Music Teacher Motivation in Spanish Primary Education: A Study Based on the Self-Determination Theory*. (Doctoral Thesis, Universidad Pública de Navarra, Spain). https://academica-e.unavarra.es/xmlui/handle/2454/32531

Angel-Alvarado R. (2018b). Controversies between curriculum theory and educational practice in music education. *Revista Electrónica Complutense de Investigación en Educación Musical, 15*, 83-95. https://doi.org/10.5209/RECIEM.58530

Angel-Alvarado, R. (2021). 'Buen Vivir' and colonialism: towards decolonial pedagogies in South America. *Revista Electrónica de LEEME*, (48), 94-114. https://doi.org/10.7203/LEEME.48.21662

Angel-Alvarado, R., Belletich, O., & Wilhelmi, M. R. (2020). Exploring motivation in music teachers: The case of three primary schools in Spain. *British Journal of Music Education, 37*(3), 196-206. https://doi.org/10.1017/S0265051720000145

Angel-Alvarado, R., Casas-Mas, A., López-Íñiguez, G., & Johnson, L. (2023). Patterns of variation in sociomusical identity of school-goers in a condition of social vulnerability and musical gaps in their education. *Music Education Research, 25*(1), 74-87, https://doi.org/10.1080/14613808.2022.2128318

Angel-Alvarado, R., López-Íñiguez, G., Quiroga-Fuentes, I., & Gárate-González, B. (2022). Mapping the cultural elements that support and inhibit music teachers' sociomusical identities in Chile. *Musicae Scientiae*, *26*(4), 761–776. https://doi.org/10.1177/10298649221110834

Angel-Alvarado, R., Wilhelmi, M. R., & Belletich, O. (2019). Holistic Architecture for Music Education: A research design for carrying out empiric and interdisciplinary studies in didactics of music. *Itamar*, (5), 335-357. https://roderic.uv.es/handle/10550/71515

Ballantyne, J., & Packer, J. (2004). Effectiveness of preservice music teacher education programs: Perceptions of early-career music teachers. *Music Education Research, 6*, 299–312. https://doi.org/10.1080/1461380042000281749

Barab, S. (2014). Design-based research: A methodological toolkit for engineering. In K. R. Sawyer (ed.), *The Cambridge handbook of the learning sciences* (pp. 270–302). Cambridge University Press.

Beard, D., & Gloag, K. (2016). *Musicology: The key concepts*. Routledge.

Belletich, O., Wilhelmi, M. R., & Angel-Alvarado, R. (2016). The musical education in primary education of Spain. Spread the curriculum as a problem. *Perspectiva Educacional, 55*(2), 158-170. http://dx.doi.org/10.4151/07189729-Vol.55-Iss.2-Art.454

Bernstein, B. (2000). *Pedagogy, symbolic control and identity: Theory, research, critique*. Rowman & Littlefield Publishers.

Biasutti M, & Concina E. (2018). The effective music teacher: The influence of personal, social, and cognitive dimensions on music teacher self-efficacy. *Musicae Scientiae. 22*(2), 264-279. https://doi.org/10.1177/1029864916685929

Biasutti, M., Concina, E., Deloughry, C., Frate, S., Konkol, G., Mangiacotti, A., Rotar Pance, B., & Vidulin, S. (2021). The effective music teacher: A model for predicting music teacher's self-efficacy. *Psychology of Music, 49*(6), 1498–1514. https://doi.org/10.1177/0305735620959436

Biesta, G., & Miedema, S. (2002). Instruction or pedagogy? The need for a transformative conception of education. *Teaching and Teacher Education, 18*(2), 173-181. https://doi.org/10.1016/S0742-051X(01)00062-2

Bolondi, G., Ferretti, F., & Giberti, C. (2018). Didactic contract as a key to interpreting gender differences in maths. *Journal of Educational, Cultural and Psychological Studies, 2018*(18), 415-435. https://doi.org/10.7358/ecps-2018-018-bolo

Brien, M., Forest, J., Mageau, G., Boudrias, J., Desrumaux, P., Brunet, L., & Morin, E. (2012). The basic psychological needs at work scale: Measurement invariance between Canada and France. *Applied Psychology: Health and Well-being, 4*(2), 167-187.

Brousseau, G. (1997). *Theory of Didactical Situations in Mathematics*. Springer.

Burland, K. (2020). Music for all: Identifying, challenging and overcoming barriers. *Music & Science*, 3. https://doi.org/10.1177/2059204320946950

Cain, T. (2013). 'Passing it on': beyond formal or informal pedagogies. *Music Education Research, 15*(1), 74-91. https://doi.org/10.1080/14613808.2012.752803

Carey, G., Harrison, S., & Dwyer, R. (2017). Encouraging reflective practice in conservatoire students: A pathway to autonomous learning? *Music Education Research, 19*(1), 99-110. https://doi.org/10.1080/14613808.2016.1238060

Carrero, V., Soriano, R., & Trinidad, A. (2012). *Teoría fundamentada Grounded theory: El desarrollo de la teoría desde la generalización conceptual*. Centro de Investigaciones Sociológicas.

Casas-Mas, A., Pozo, J. I., & Montero, I. (2014). The influence of music learning cultures on the construction of teaching-learning conceptions. *British Journal of Music Education, 31*(3), 319-342. https://doi.org/10.1017/S0265051714000096

Chevallard, Y. (1997). La transposición didáctica: Del saber sabio al saber enseñado. Aique.

Chevallard Y., & Bosch M. (2020). Didactic Transposition in Mathematics Education. In S. Lerman (eds.), *Encyclopedia of Mathematics Education* (pp. 214-218). Springer. https://doi.org/10.1007/978-3-030-15789-0_48

Davenport, E. C., Davison, M., Liou, P., & Love, Q. (2015). Reliability, dimensionality, and internal consistency as defined by Cronbach: Distinct albeit related concepts. *Educational Measurement: Issues and practice, 34*(4), 4-9.

Drouin, M., Stewart, J., Van Gorder, K. (2015). Using methodological triangulation to examine the effectiveness of a mentoring program for online instructors. *Distance Education, 36*(3), 400-418. https://doi.org/10.1080/01587919.2015.1081735

European Commission (2013). *Ethics for researchers: Facilitating research excellence in FP7*. Publication Office of the European Union.

Fautley, M. (2010). *Assessment in music education*. Oxford University Press.

Field, A. (2000). *Discovering statistics using SPSS for Windows*. Sage.

Georgii-Hemming, E., & Lilliedahl, J. (2014). Why "What" Matters: On the Content Dimension of Music Didactics. *Philosophy of Music Education Review, 22*(2), 132-155. https://doi.org/10.2979/philmusieducrevi.22.2.132

Godino, J. D., Batanero, C., & Font, V. (2007). The onto-semiotic approach to research in mathematics education. *The International Journal on Mathematics Education, 39*(1-2), 127-135.

Godino J. D., Bencomo D., Font V., & Wilhelmi M. R. (2006). Análisis y valoración de la idoneidad didáctica de procesos de estudio de las matemáticas. *Paradigma, XXVII*(2), 221-252.

Godino, J. D., Font, V., Wilhelmi, M. R., & De Castro Hernández, C. (2009). An onto-semiotic approach to the normative dimension in mathematics education. *Enseñanza de las Ciencias, 27*(1), 59-76. https://raco.cat/index.php/Ensenanza/article/view/132207

Godino J. D., Wilhelmi, M. R., & Bencomo, D. (2005). Suitability criteria for a mathematical instruction. A teaching experience with the function notion. *Mediterranean Journal for Research in Mathematics Education, 4*(2), 1–26.

Gómez, M. (2005). La transposición didáctica: Historia de un concepto. *Revista Latinoamericana de Estudios Educativos, 1*(1), 83-115.

Green, L. (2017). *Music, informal learning, and the school: A new classroom pedagogy*. Routledge.

Grieser, D. R., & Hendricks, K. S. (2018). Review of Literature: Pedagogical Content Knowledge and String Teacher Preparation. *Update: Applications of Research in Music Education, 37*(1),13-19. https://doi.org/10.1177/8755123318760970

Hair, J. F., Black, W. C., Babin, B., J., & Anderson, R. E. (2014). *Multivariate Data Analysis*. Pearson Education.

Hallam, S., Rinta, T., Varvarigou, M., Creech, A., Papageorgi, I., Gomes, T., & Lanipekun, J. (2012). The development of practising strategies in young people. *Psychology of Music, 40*(5), 652-680.

Hess, J. (2019). Singing our own song: Navigating identity politics through activism in music. *Research Studies in Music Education, 41*(1), 61–80. https://doi.org/10.1177/1321103X18773094

Hesse-Biber, S. (2010). *Mixed methods research: Merging theory with practice*. The Guilford Press.

Hooper, G. (2016). *The discourse of musicology*. Routledge.

Jank, W. (2014). Didaktik, Bildung, Content: On the Writings of Frede V. Nielsen. *Philosophy of Music Education Review*, *22*(2), 113-131. https://doi.org/10.2979/philmusieducrevi.22.2.113

Lilliedahl, J. (2015). The recontextualisation of knowledge: towards a social realist approach to curriculum and didactics. *Nordic Journal of Studies in Educational Policy*, *1*(1), 40-47. https://doi.org/10.3402/nstep.v1.27008

López-Íñiguez, G., & Pozo, J. I. (2014). The influence of teachers' conceptions on their students' learning: Children's understanding of sheet music. *British Journal of Educational Psychology*, *84*(2), 311-328. https://doi.org/10.1111/bjep.12026

McMillan, J., & Schumacher, S. (2012). *Investigación Educativa*. Pearson Educación.

McKenney, S., & Reeves, T. C. (2012). *Conducting Educational Design Research*. Routledge.

MECD. (2014). Orden ECD/686/2014, de 23 de abril, por la que se establece el currículo de la Educación Primaria para el ámbito de la gestión del MECD y se regula su implantación, así como la evaluación y determinados aspectos organizativos de la etapa. *BOE*, (106), 33827-34369. https://www.boe.es/eli/es/o/2014/04/23/ecd686

Mellinger, C. D., & Hanson, T. A. (2017). *Quantitative research methods in translation and interpreting studies*. Routledge.

Mertens, D. M., & Hesse-Biber, S. (2012). Triangulation and mixed methods research: Provocative positions. *Journal of Mixed Methods Research*, *6*(2), 75-79.

Murillo, F., & Martínez-Garrido, C. (2012). *Análisis de datos cuantitativos con SPSS en investigación socioeducativa*. Universidad Autónoma de Madrid.

Nielsen, F. V. (2007) Music (and Arts) Education from the point of view of didaktik and bildung. In L. Bresler (Eds.) *International Handbook of Research in Arts Education* (pp. 265-285). Springer.

Pacheco-Costa, A. (2019). Teachers' strategies for playing by ear in one-to-one instrumental lessons: a case-study in Spain. *Music Education Research, 21*(2), 161-173. https://doi.org/10.1080/14613808.2018.1553943

Pozo, J. I., Pérez-Echeverría, M. P., Torrado, J. A. y López-Íñiguez, G. (2020). *Aprender y enseñar música: Un enfoque centrado en el alumnado*. Morata.

Rosenthal, J. A. (2012). *Statistic and data interpretation for social work*. Springer.

San Martín, D. (2014). Grounded Theory and Atlas.ti: Methodological Resources for Educational Research. *Revista Electrónica de Investigación Educativa*, 16(1), 104-122.

Schneuwly, B., & Vollmer, H. J. (2018). Bildung and subject didactics: Exploring a classical concept for building new insights. *European Educational Research Journal, 17*(1), 37-50. https://doi.org/10.1177/1474904117696096

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher, 15*, 4-14.

Siegel, S. (1956). *Non parametric statistics for the behavioral sciences*. McGraw.

Spruce, G. (2017). The Power of Discourse: Reclaiming Social Justice from and for Music Education. *Education 3-13: International Journal of Primary, Elementary and Early Years Education, 45*(6), 720-733. https://doi.org/10.1080/03004279.2017.1347127

Swanwick, K. (2008). The 'good-enough' music teacher. *British Journal of Music Education, 25*(1), 9-22. https://doi.org/10.1017/S0265051707007693

Swanwick, K. (2016). *A developing discourse in Music Education: The selected works of Keith Swanwick*. Routledge.

Väkevä, L., & Westerlund, H. (2007). The 'method' of democracy in music education. *Action, Criticism, and Theory for Music Education, 6*(4), 96-108.

Westerlund, H. (2003). Reconsidering aesthetic experience in praxial music education. *Philosophy of Music Education Review, 11*(1), 45-62.