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Expanding Conventional Music Literacy:

Soundscape, Improvisation, and ICT in Prospective Teacher Training

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RESUMEN

Hoy en día, la educación musical debe abogar por un enfoque interdisciplinar que supere la visión tradicional del fenómeno sonoro como un lenguaje técnico-instrumental asociado a la lectura de una partitura, y dé respuesta a cómo consumimos actualmente la música, las posibilidades didácticas del sonido en conexión con otros contenidos curriculares y los recursos actuales de experimentación sonora vinculados al medio digital. Este artículo parte del cambio de paradigma que supusieron los llamados métodos creativos de la década de 1970 y aborda su implementación en una asignatura del Grado de Maestro en Educación Primaria de la Universidad de Oviedo: *Música y su Aplicación Didáctica*. Comenzamos revisando la fundamentación teórica que sirvió para el desarrollo de la materia. A continuación, exploramos varios recursos que aplicamos en las prácticas de aula, tales como el paisaje sonoro, la improvisación o el uso de TIC interactivas de creación y visualización del sonido. La parte final analiza el uso de estas herramientas en un conjunto de trece unidades didácticas que el alumnado realizó como trabajo final de la asignatura durante el curso 2021-2022, con el fin de conocer la manera en la que los estudiantes abordan la experimentación sonora para la enseñanza de diferentes contenidos del currículo de Primaria, entre otras cuestiones, como estrategias propuestas por el alumnado para la atención a la diversidad o la selección de determinadas herramientas digitales en sus propuestas didáctico-musicales, teniendo en cuenta los ámbitos de la educación musical trabajados en sus unidades.

ABSTRACT

Today, music education should advocate for an interdisciplinary focus that goes beyond the traditional vision of the phenomenon of sound as a technical-instrumental language associated with reading a score and responds to how we currently consume music, the didactic possibilities of sound in connection with other curricular content, and current resources for audio experimentation linked to the digital environment. This article arises from the paradigm change resulting from the so-called creative methods of the 1970s and focuses its implementation on a module from the Master's Degree in Primary Education at the University of Oviedo: Music and Its Application in Teaching. We begin by reviewing the theoretical rationale for the subject's development. Then, we explore several resources that we apply in classroom practice, such as soundscape, improvisation, or the use of interactive ICT for creating and visualizing sound. The final section analyses the use of these tools in a set of 13 teaching units that students completed as the final project of the module in 2021-2022. The aim was to learn how students approach audio experimentation to teach varied content from the Primary curriculum, among other things such as strategies proposed by students to pay attention to diversity or select specific digital tools in their musical-didactic proposals, bearing in mind the areas of music education covered in their units.

Introduction: from product to sound process

Seeing the musical phenomenon as a product linked to the performance of a text-object (the score) has long since been displaced by understanding it as a process that influences and is influenced by our cultural and social habits. In musicology, the field of so-called performance studies tries to investigate the behaviours that music triggers in people. This paradigm shift is underlined by Alejandro L. Madrid when he states that

> While music studies [...] asks what music is and seeks to understand musical texts and musical performances in their own terms according to specific cultural and social contexts, a performance studies approach to music would ask what music does and allows people to do. (Madrid, 2009, para. 5)

Understanding music and sound as a discourse that impels us in different ways, Christopher Small (1998) states that music does not exist objectively unless we make it and proposes the verb musicking to underline this performative quality over and above traditional identification with the idea of a musical work.

Other concepts from urban and popular music studies – such as Philip Auslander's (2006) concept of *musical personae* – focus on how making music allows the performer to construct an identity on stage. Likewise, works framed in the field of Sound Studies, such as LaBelle (2018), are based on the premise of "what it is that sound does, how it behaves and performs, what it evokes, and the ways in which subjectivity and social formations are supported and agitated by the listening sense" (LaBelle, 2018, p. 1); this is to develop the idea of "sonic agency" – the possibility of representing oneself in the public sphere not through what is seen but through what is broadcasted or heard.

These and other studies have contributed to forging a more holistic view of sound, inverting the product-object / process-interpretation relationship. Extrapolating this approach to music education, the so-called creative methods or "awakening pedagogy" of the 1970s (Brian Dennis, Lili Friedemann, Jos Wuytack, John Paynter or especially Murray Schafer) promoted experimentation with new media and the development of students' creativity, moving away from the previous instrumental methods (Orff, Kodály) in which the composer monopolised the creative aspects through fixed pedagogical materials (Gainza, 2004). Practices such as free improvisation, the use of non-conventional writing, listening to works of concrete or electronic music linked to new technologies, and the concept of soundscape (in its duality of listening and creation) broadened the meanings attributed to music, mediated until then by the reading and writing of the Western notation system.

More recently, the approach to these resources by disciplines complementary to the pedagogical field has surpassed the initial interest from a creative point of view. Thus, developmental psychology research by Daniel Stern or Maya Gratier connects improvisation with the communicative models of early childhood, considering that the interplay of vocal and

gestural exchange in play between babies and their mothers is not based on imitation but on a series of improvised variations within the same expressive timing. This leads Michel Imberty to consider improvisation as an almost universal biological fact, as the "primary condition of intersubjective communication and musicality" (Imberty, 2014, p. 8). In the case of soundscape, some didactic proposals are based on reconstructing the background sounds of students' childhood – from environmental noises to melodies, songs, or musical styles – to learn more about their social habitat and favour their inclusion (Ayala & Castillo, 2008), while others promote sensitivity towards the environment by listening to sound effects of pollution, deforestation or melting ice (Tojeiro, 2020). It is not my intention to review all the literature generated by the incorporation of these resources into the music classroom but rather to point out the starting points that have served as a basis for our own teaching practice in prospective teacher training. In this sense, this article aims to demonstrate how some proposals have been implemented based on improvisation, soundscape, and interactive sound experimentation websites in a third-year module on the Bachelor's in Primary Education at the University of Oviedo: *Music and Its Didactic Application*.

This annual module, belonging to the Didactic and Disciplinary Training unit, aims to "offer students an interdisciplinary perspective on music and its usefulness as a didactic tool for tackling the different topics of the Primary curriculum"[1]. Considering that the students who attend do not belong to the Music Education specialisation and that their training is generic, our premise was to avoid as far as possible the use of standard musical notation or identifying musical skills with a technical-instrumental type of knowledge, to understand the point of view I mentioned at the beginning of this article: what music and sound produce in us and their capacity to describe reality or discover aspects of our personality. On another note, introducing prospective primary school teachers to the use of ICT and the potential of improvisation seems necessary given their later professional insertion since, according to Casanova and Serrano (2018), most of the regional curricula in Spain continue to favour merely theoretical musical learning, based on recognising the vocabulary of written solfège as opposed to developing creativity or applying it to the teaching of other curricular content.

This convinces us that the best way to make the most of the course content for the students of *Music and Its Didactic Application* is by starting from the broadest possible vision of making musical sound. In the first part of this article, I set out the theoretical foundations that served to develop this interdisciplinary approach. In the second part, I explain some devised classroom practices related to the three resources mentioned (soundscape, improvisation, and the use of interactive web applications). In the third part, I provide a comparative analysis of 13 didactic units carried out in groups by the students as the final module assignment, for which I propose quantitative-qualitative research following categories for analysis that I will describe later.

1 As stated in the module syllabus, available at: https://www.uniovi.es/-/grado-en-maestro-en-educacion-primaria-2014 (accessed 15th July 2022).

Theoretical foundations: towards an interdisciplinary music education

Both the syllabus of *Music and Its Didactic Application*[2] and several of its learning outcomes (LA) aim to achieve interdisciplinary knowledge that addresses music as a tool to cultivate interculturality, inclusion, or violence prevention – aspects that have a bearing on the development of identity, relationships between students, and self-knowledge – before mastering musical language itself. Likewise, they highlight the use of new technologies for the design and implementation of musical activities (LA8.3), as well as cinema, music videos and audio for reinforcing and acquiring musical content (LA8.1). In this section, I cite several studies that have served to develop a practical and critical approach to this syllabus. In line with Arostegui (2014), my approach emphasises students' previous experiences and social context to build knowledge and focuses on musical genres that align with their listening habits as opposed to the cultural hegemony of so-called classical music[3].

Hargreaves, Marshall and North (2003) point out that, until the 1980s, the norm for listening was an experimental psychological model based on psychometric and acoustic tests that measured individual characteristics (the ability to perceive rhythm, pitch, melody, and harmony). The authors' proposal is situated within the framework of social psychology, investigating people's experiences with music in real contexts. Two effects result from the globalisation of information in today's digital consumer world: on the one hand, the disappearance of the boundaries, traditionally drawn at school, between music considered "serious" and "popular"; and on the other hand, its use as an accompaniment to everyday tasks, creating moods or regulating excitement levels. In this sense, one of today's educational challenges is achieving a balance between musical learning at school – still dominated by traditional Western written models – and outside it – where there is often a kind of self-directed learning among students, "exchanging skills and knowledge with each other by watching, imitating and talking about music" (Hargreaves, Marshall & North, 2003, p. 157).

Another of the major issues in music education today, according to the aforementioned authors, revolves around the specification of its objectives: should skills be promoted only for the mastery of musical communication (listening, performance, composition), or can broader aims be pursued related to issues such as the formation and expression of identity, emotional intelligence, knowledge management or social relations? Figure 1 shows the possible areas of influence of an interdisciplinary education that addresses musical-artistic, personal, and socio-cultural aspects; the first approach corresponds to a specialisation model specific to the conservatory – traditionally transmitted in teaching – while the next two relate to the social role that music plays outside the institution

2 The course has four teachers, each responsible for a different group. Although we share an initial syllabus designed by the coordinating teacher, this article focuses on our experience with group B during the 2021–2022 academic year.

3 In the author's words: "In order to combat this cultural hegemony, the critical curriculum advocates for establishing an intercultural music education in which academic music, or any other music, loses its hierarchical character, also including other musical styles from traditionally invisible cultural groups to the academy, such as jazz, rock and pop, flamenco, etc." (Arostegui, 2014, p. 24).

and its advantages in improving quality of life. This proved to be particularly useful for introducing students to the improvisation practices that will be detailed later; the intrapersonal benefits of individual performance – expressiveness, emotion regulation, self-awareness – combine with more interpersonal benefits such as teamwork, communication, and cooperation.

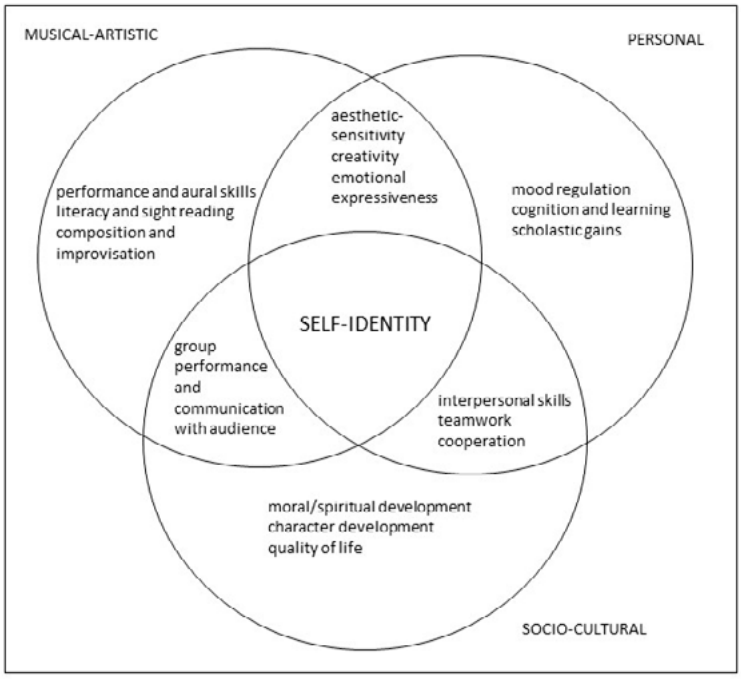


Figure 1. Interdisciplinary music education objectives (Hargreaves, Marshall & North, 2003, p. 160).

Paying attention to the musical genres most in demand among students over the primacy of the classical repertoire also makes it possible to move towards an intercultural type of education, another of the pillars of the course. For Bravo and Moya (2006), the transfer and interdependence of cultural practices have increased as a result of technological globalisation and the growing presence of migrant students in the classroom, to the point of considering that we are all somehow "cultural refugees". For the authors, a multicultural education necessarily starts with "the music they listen to regularly in their daily lives outside school" (Bravo & Moya, 2006, p. 134). Their proposed primary education teaching unit uses four styles – African music, jazz, black vocal music, and rock – each examined using resources such as film soundtracks, dramatisation exercises, dance or musicograms.

However, becoming aware of and accepting the diversity of world music does not mean developing intercultural competence. According to Bernabé (2012), we must progress from a multicultural focus on recognition of and respect for differences towards an intercultural perspective that delves into common socio-cultural legacies:

> Intercultural education always mentions the importance of difference, of exchange with 'the other', of the need to know the difference in order to respect it [...]; so much insistence on difference can lead to not recognizing the similarities and debts that some cultures have with others. (Bernabé, 2012, p. 37)

According to Bernabé (2012), teaching programmes in Spain that deal with non-classical music styles tend to pigeonhole them in the sphere of oral folk tradition without considering that other world regions also produce written concert music, not just popular music (p. 41). Thus, we fall into the fallacy of identifying non-Western cultures with more rudimentary repertoires as exotic, which encourages difference. To achieve an intercultural music classroom, Bernabé suggests improvisation as a tool that guarantees "respect for difference, exchange, fusion, and the enhancement of students' creativity and will contribute to communicating the emotions of the 'composer' (learner)" (2012, p. 46).
A third aspect that extends the traditional music education objectives is its use to raise awareness and prevent violence. Again, it is essential to begin with music that feels familiar to the students and to investigate through which media that is consumed and how it contributes to perpetuating specific patterns of social interaction. According to Llamas (2005), unlike the positivist approach inherited from the conservatories, an alternative is to use music to address problems that relate to students' life experiences. Thus, this transdisciplinary vision

> considers the social and cultural aspects of sound, beginning with the experiences and interests of the students [...] In this way, any musical style is completely valid (pop, rock, jazz, classical music, ethnic music, flamenco...) to deal with a wide range of social problems. (Llamas, 2005, p. 1)

Llamas brings the idea of educating "through" and not so much "for" the music, and tackles gender violence by connecting lyrical analysis of popular songs with the subject of Social Sciences.
A more recent work (Hormigos, 2020) is based on the premise that the meaning of contemporary music is highly influenced by the socialisation models transmitted by cultural industries: in a saturated model of consumption, adolescents tend to develop simple listening that favours the normalisation of the sexist content present in many songs projected by the media, mass platforms or social networks. Using a sample of 350 songs across nine different styles, he analysed whether their lyrics encourage gender violence (53.1%) or denounce it (22.6%). The most interesting aspect of his proposal is the relationship he establishes between the messages conveyed and the patterns of social behaviour that students learn in their daily lives. He selects their five most popular songs and establishes four objectives to work on in the classroom:

> To analyse the problem of gender-based violence; to help understand the sociological variables of the problem; to identify these variables in the music discourse surrounding the adolescent; and to use popular music to transmit positive values that help to combat the problem. (Hormigos, 2020, p. 100)

The research cited up to this point focuses on the social dimension of music and the meanings we give to it in our daily lives. These aspects are considered in the *Music and Its Didactic Application modul*e, aiming to help students to achieve the broadest vision of sound as a phenomenon – within the aforementioned critical approach to the curriculum (Arostegui, 2014) – and to integrate it as a transversal educational resource for working on curricular content or developing attitudinal competencies. Similarly, I have also selected a series of educational resources that connect the sound dimension with how we perceive reality and express our identity. These tools are framed within the disciplines of soundscape and improvisation, respectively.

Practical proposals and resources for sound experimentation

Soundscape

The most comprehensive explanation of the concept of soundscape, devised by Murray Schafer, was included in his book *The Tuning of the World* (1977), where he developed aspects such as the capacity of sound to bring back memories of a specific place, the sound effects of technological and industrial impact, the politicisation of silence, and the control of certain sounds as commercial brands. Schafer also proposed technical vocabulary for the analysis of the soundscape – such as keynote sounds, sound signals and soundmarks, hi-Fi and lo-Fi landscapes, presence and acoustic horizon, etc. – and various methods of graphic representation such as topographical sound maps, maps of events or maps of routes through a space. (These resources have now been replaced by geolocation systems that function as sound libraries, such as the *Mapa Sonororu* developed by the Universidad Laboral de Gijón[4].) However, the most interesting focus of Schafer's research for teacher training students is his pedagogical approach. His five didactic booklets – *The Composer in the Classroom* (1965), *Ear Cleaning* (1967), *The New Soundscape* (1969), *When Words Sing* (1970) and *The Rhinoceros in the Classroom* (1975) – focus on experiential learning that can be used to rethink the inherited meanings of traditional music teaching.

In *The Composer in the Classroom*, for example, Schafer and his students at Simon Fraser University deconstructed the very concept of music from the conventional idea of organised sound or sound pleasing to the ear to its formulation as "sound produced with the intention of being heard" (Schafer, 1965/1983, pp. 20–21). A few years later, in *The New Soundscape*, he recognised the limitations of this first definition and used John Cage's

4 Available at https://mapasonoru.com/mapa.php. Accessed 20th July 2022.

maxim – "Music is sounds, sounds heard around us whether we're in or out of concert halls" – to argue that a radical change in music education was needed:

> Today all sounds belong to a continuous field of possibilities lying within the comprehensive *dominion of music* [...]. There is a shattering corollary to this for all music educators [...] *And the whole nature of this theory and practice is now going to have to be completely reconsidered.* (Schafer, 1969, p. 2)

Some illustrations in this book serve to reflect on the relative meaning associated with music, noise, and silence considering the intentionality of listening – "noise is sound we have been trained to ignore" (Schafer, 1969, p. 11) – for example, listening to Beethoven's Eroica in a concert hall context (Figure 2). On the other hand, in *Ear Cleaning*, Schafer proposed exercises to rediscover sound parameters through experimentation: one of the recurrent exercises was to ask his students to find an "interesting" and a "contrasting" sound until each of them, divided into groups, had five different sounds with which to perform an instrumental improvisation (Schafer, 1967, pp. 40–41). In other cases, the improvisation started from abstract schemes that allowed them to combine the parameters in all possible ways (Figure 3).

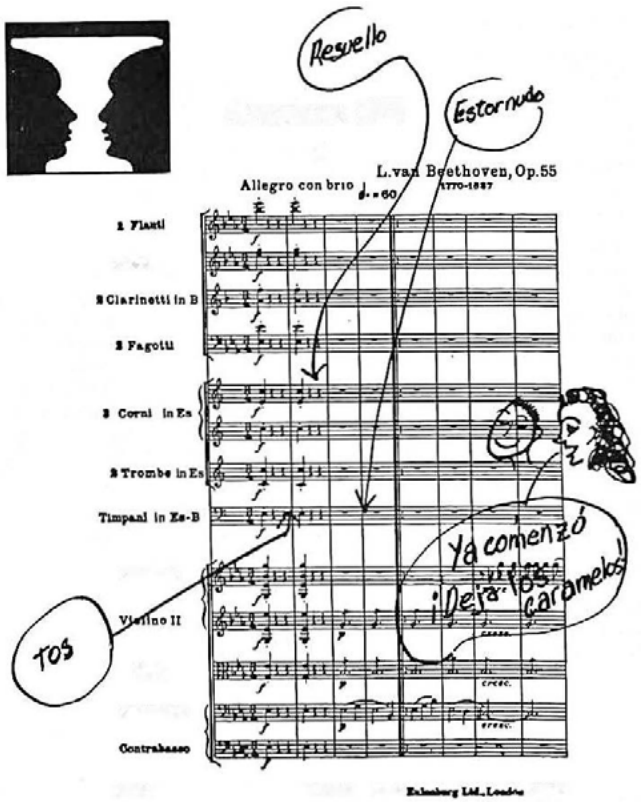
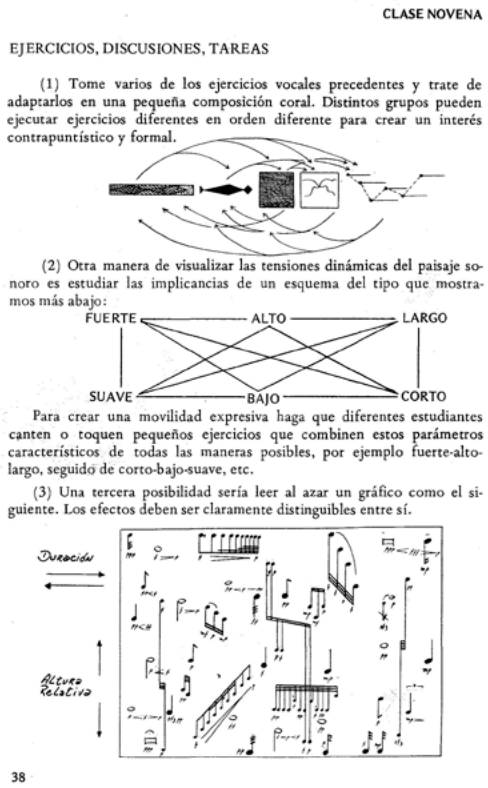


Figure 2. Illustration of the concepts of figure-ground and music-noise (Schafer, 1969, p. 11).



CLASE NOVENA

EJERCICIOS, DISCUSIONES, TAREAS

(1) Tome varios de los ejercicios vocales precedentes y trate de adaptarlos en una pequeña composición coral. Distintos grupos pueden ejecutar ejercicios diferentes en orden diferente para crear un interés contrapuntístico y formal.

(2) Otra manera de visualizar las tensiones dinámicas del paisaje sonoro es estudiar las implicancias de un esquema del tipo que mostramos más abajo:

Para crear una movilidad expresiva haga que diferentes estudiantes canten o toquen pequeños ejercicios que combinen estos parámetros característicos de todas las maneras posibles, por ejemplo fuerte-alto-largo, seguido de corto-bajo-suave, etc.

(3) Una tercera posibilidad sería leer al azar un gráfico como el siguiente. Los efectos deben ser claramente distinguibles entre sí.

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Figure 3. Some improvisation diagrams (Schafer, 1967, p. 26).

A listening and classification exercise we use in class is inspired by one of the tasks described in *The New Soundscape*. Schafer asked his students for five consecutive days to turn their chairs towards the wall, close their eyes and listen for ten minutes to the sounds they perceived, and then describe them as natural, mechanical, electrical, or human-produced (Schafer, 1969, p. 17). In our study, we listened to one of the tracks from Schafer's album *The Vancouver Soundscape* (1973), entitled "Vancouver Harbour Ambience"[5]. After explaining some terms that the author invented such as *signals* (intermittent sounds) and *marks* (characteristic sounds with which the population of a certain place identifies itself), we classified the type of landscape (natural, urban, technological), its temporal structure (continuous, discontinuous), its density, and the number of perceived layers[6]. This first exercise is followed by a debate on its didactic applicability. By these means, the aim is to understand the transversality of soundscape as a concept and evolve the content of not only the Art Education module but also other subjects such as *Social Sciences* or *Natural Sciences*.

Another practice we carried out is based on the idea of the "chronological sound frieze" developed by Ayala and Castillo (2008). From an eco-educational perspective, the au-

5 Available in MP3 format at https://www.sfu.ca/~truax/vanscape.html (accessed 20th July 2022).

6 This classification proposal is inspired by an article by Mexican sound artist Manuel Rocha Iturbide entitled "Estructura y percepción psicoacústica del paisaje sonoro electroacústico", available at http://revistas.unam.mx/index.php/pim/article/view/23847. Accessed 20th July 2022.

thors propose that each student create a PowerPoint presentation with their particular sound history using recordings or verbal descriptions that allow them to rescue sounds on the verge of extinction or help to reinforce their inclusion in the social climate of the classroom. In our classroom, we asked students to create a music video with personal photographs or images they like and accompany them with a sound background that inspires their experiences. However, most of them chose trendy songs, and some used soundscape creation applications such as TaoMix or recordings taken from their mobile phones to illustrate certain places familiar to them.

Improvisation: from instrumental performance to interactive ICT

Schafer, Paynter and other authors of creative methods have defended improvisation as the best tool to approach knowledge sound parameters from an empirical point of view. In practice, experimentation with pitch, duration, intensity, and timbre is often carried out through unconventional graphics: vocal glissandi lines, long and short strokes on the horizontal plane, symbolic shapes of different sizes and colours, or pictograms of everyday objects. These serve as alternative representations for improvising on each of these elements. In his collection, *Piezas gráficas para la educación musical*, Palacios (1993) points out the didactic advantages of using this type of open writing: they provide a stimulus for improvisation by allowing the performer a wide margin of creativity; in these scores, the "plasticity" of sound comes to the fore in comparison with the symbolic representation of traditional solfège; the simplicity of the graphic materials helps obtain immediate results without prior technical learning; finally, the new graphics help with understanding the essence of many contemporary repertoire works that we can incorporate into the primary music classroom.

From an educational perspective, Violeta Hemsy de Gainza (1983) understands improvisation as a playful and globalising activity – a musical game that

> begins long before the systematic learning of music and should not be interrupted throughout the whole process [...]. Pedagogy aspires to achieve graded chains in the area of improvisation and guided play which start from the most elementary forms and contribute to educating – that is, to develop and fulfil the individual. (Gainza, 1983, p. 47)

The didactic objectives she sets for improvisation are in line with the diagram of possible outcomes of interdisciplinary music education shown in Figure 1: for the author, improvising is a form of "unloading" (expression-catharsis) that allows the individual to express themselves on a physical, affective, mental and social level (the socio-cultural objectives of the diagram); it also works as a learning technique to acquire self-confidence and self-assurance (personal objectives) and to internalise the elements of musical language (musical-artistic objectives; Gainza, 1983, p. 25).

At a curricular level, improvisation is transversal content that appears throughout the entire primary education stage. Following Hemsy de Gainza, improvisation can be approached from two types of stimuli: musical (those related to sound parameters as raw material for work, namely: sound, rhythm, melody-harmony, form, genre, style) and extra-musical (impressions and descriptions of external phenomena, such as the imitation of natural sounds, or communication of feelings and moods; Gainza, 1983, p. 13). In our classroom, we developed exercises aimed at internalising and maintaining the pulse and creating specific rhythmic patterns regardless of pitch, considering that rhythmic expression is the first element of musicality, appearing at an early age (Pascual Mejía, 2006). It is directly related to activities that we carry out in our daily lives (walking, measuring and perceiving time, etc.) and, in the case of instrumental performance, it helps to work on coordination, synchronisation and periodicity of bodily gestures to progress from there to parameters such as intensity or duration (speed and energy of the movement in a given time).
I describe some of these exercises below, carried out in *Music and Its Didactic Application*:

- Pulse and rhythmic patterns: we choose a group of three students, each with a pair of claves. The first one plays crochets (with an approximate duration of one second), the second plays quavers, and the third plays semiquavers. When the teacher says "change", everyone must switch to another. The experiment continues by doing the same exercise with three different pupils, only now they decide for themselves when to change the pattern without saying anything; they must react to the first change they hear. This exercise encourages active listening and internalisation of the pulse, improvising on three rhythmic figures.
- Melodic improvisation with plate instruments: we place two rows of three or four xylophones facing each other. The teacher starts by playing an improvised sequence on a basic rhythm and keeping the same notes (e.g., C-D-E-G-E-D-C).

    - The students imitate the sequence of notes. The teacher then varies the basic rhythm while keeping the same time signature. The pupils do not have to repeat the notes they improvise; they can be other notes, but the rhythmic sequence must be the same. This exercise practises reacting to the rhythm and maintaining it regardless of pitch perception.

    - With the same two rows, one of the students creates a melody with the rhythm indicated below and the rest of the classmates in the same row imitate it in sequence. The students in the other row mark a minim beat with two repeated notes (e.g. C-G). On

the call of "double", everyone should change the beat by half: the accompanying students switch from minims to crochets.

- Improvised instrumental combo: two students with claves play a ternary beat – one plays crochets, and the other plays dotted minims (beat and accent). The student playing crochets may occasionally improvise quavers. Another student joins in with the congas with an improvised rhythm that fits within the time signature.

  - Another two students join in by improvising a melody with xylophones that fits the measure, imitating each other. Finally, a sixth student joins the combo, marking the accent with the triangle. Despite the simplicity of the exercise, the integration achieved within the group through the common element of the beat is high, to the point of producing a sensation of temporary suspension that is characteristic of group improvisation.

Improvisation can be worked on not only through Orff instruments. There is now interactive creation software that allows experimentation with pitch, rhythm and timbre in real time, or creation of compositions from pre-recorded tracks without struggling with written notation (these are the so-called DAWs (Digital Audio Workstations) – sound editing software such as Audacity, Cubase, Protools, AudioSculpt, etc.). The introduction of ICT in music education has meant a quantitative and qualitative change in terms of the teaching-learning paradigm, moving towards a constructivist model. According to Hernández and Martín (2014), with the use of ICT,

> The student is no longer the unidirectional receiver of the accumulation of information of yesteryear: they have taken a step forward when processing information and complementing it with that received from the teacher, who has also seen their role change from unidirectional transmitter to guide in the process. These constructivist approaches require planning and implementation, and the use of ICT facilitates their understanding and usability. (Hernández & Martín, 2014, p. 1)

The wide offer of learning, training, and music creation programmes on the market makes such prior planning necessary because, although we are all users nowadays, not

all of us are competent in the use of these new technologies (Cózar & Moya, 2013). Tejada (2014) classifies music education software into three types: tutor (or guide of the teaching-learning process), trainer (provides exercises and corrects them automatically) and instructional object (software programmed to perform specific tasks). He also distinguishes between "general purpose" programmes – designed to record, edit audio or write scores, but not to teach music – and "specific purpose" programmes – auditory trainers, and programmes designed for analysis or to present music theory content (2014, p. 198). *In Music and Its Didactic Application*, we demonstrate web resources aligned with this second group, such as teoría.com, aprendomúsica.com, and therhythmtrainer.com. However, the most used programme, and the one incorporated by the students in their didactic units, was Chrome MusicLab. This application interface is much more intuitive than those mentioned above as it is not based on the solfège graphic elements characteristic of theoretical training programmes. The resources contained in Chrome MusicLab are oriented towards manipulating objects and encouraging experimentation and creativity from a playful point of view. The programme is handy for introducing the more technical content taught in the module's later topics: rhythm, pitch, timbre, and definitions such as harmonic and inharmonic sound.

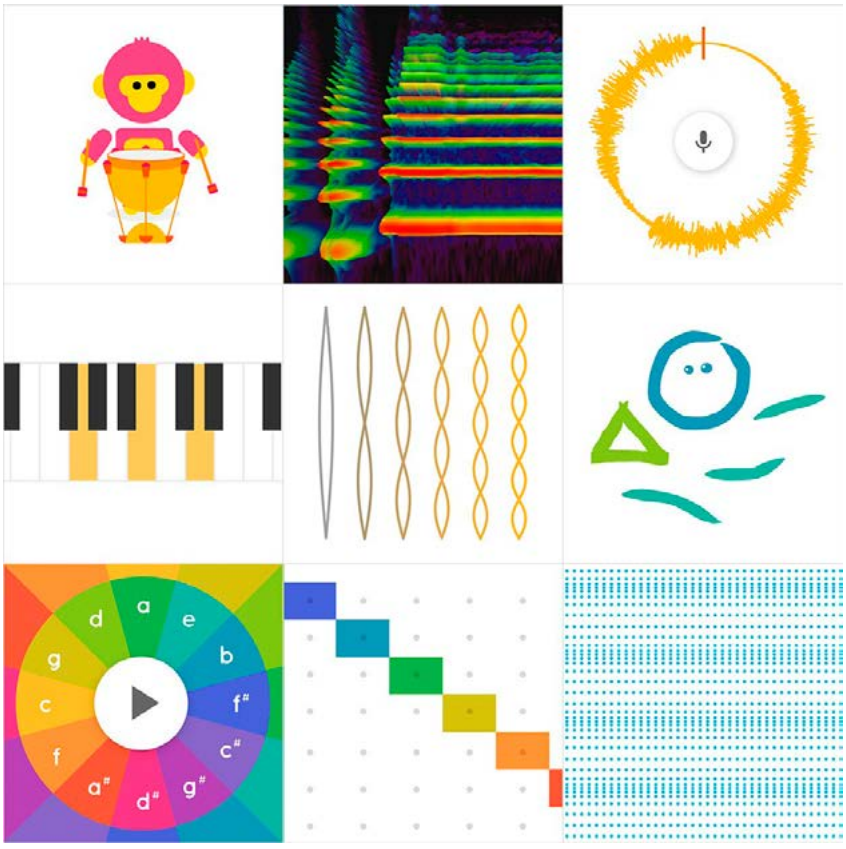

Figure 4. General interface of the Chrome MusicLab website.

Analytical methodology and results: application and students' proposals

In this article, I propose a quantitative-qualitative investigation of 13 didactic units delivered by university students, by analysing the following categories with their items: tools used and their application in specific activities (soundscape, improvisation, ICT, use of non-conventional graphics); subjects involved in the didactic approach, to evaluate the use of sound as an interdisciplinary resource across different course contents; types of music education activities (auditory discrimination, vocal expression, instrumental expression, corporal expression); and ideas of activities to integrate students with SEN (Special Educational Needs) through sound experimentation.

As for the results, it is worth paying attention first to the titles of these units, as several reflect a clear connection with soundscape or the method of chronological sound frieze developed by Ayala and Castillo (2008), while others focus on the relationship between music and emotional expression or explore the basic parameters of sound: *El Principito. Conciencia y valores (The Little Prince. Consciousness and Values,* 5th grade); *La rítmica y la expresión corporal (Rhythm and Body Expression,* 2nd grade); *Las cualidades del sonido (Sound Qualities,* 4th grade); *¡Música para nuestros oídos! (Music for Our Ears!,* 6th grade); *Música y movimiento (Music and Movement,* 5th grade); *La oreja de Vang Orff (Vang Orff's Ear,* 4th grade); *Pinceladas musicales, (Musical Brushstrokes,* 2nd grade); *Tu friso sonoro (Your Sound Frieze,* 2nd grade); *Tu vida en sonidos (Your Life in Sounds,* 3rd grade); *Sensaciones musicales (Musical Sensations,* 2nd grade); *Mi gran viaje musical (My Great Musical Journey,* 2nd grade); *Los sonidos de mi entorno (The Sounds of My Environment,* 5th grade); and *EmocionArte*[7] (2nd grade).

Tools and resources used

Soundscape	*El Principito* *Pinceladas musicales* *Tu friso sonoro* *Tu vida en sonidos* *Mi gran viaje musical* *Los sonidos de mi entorno* *EmocionArte*
Improvisation activities	*El Principito* *La rítmica y la expresión corporal* *Las cualidades del sonido* *¡Música para nuestros oídos!* *Música y movimiento* *La oreja de Vang Orff* *Sensaciones musicales* *Los sonidos de mi entorno* *EmocionArte*

7 Translator's note: This is a play on words combining the terms "Emotion" and "Art", which results in the translation "get moved".

ICT used	Kahoot (*La rítmica y la expresión corporal; Pinceladas musicales*) Audacity (*El Principito, ¡Música para nuestros oídos!*) Learning Music (*Beta*), ChordChord (*¡Música para nuestros oídos!*) Toy Theater (*Música y movimiento*) Chrome MusicLab (*La oreja de Vang Orff; Mi gran viaje musical*) IncrediBox (*Sensaciones musicales; EmocionArte*)
Unconventional symbols	*Música y movimiento* *La oreja de Vang Orff* *Tu friso sonoro* *Sensaciones musicales* *Los sonidos de mi entorno* *EmocionArte*

Table 1. List of resources incorporated in students' proposed activities.

As seen in Table 1, seven units (54%) use soundscape and nine (69%) use improvisation. In the case of soundscape, four units (31%) incorporate it in the duality of listening and creation. Thus, a recurrent activity is to show photographs of natural or urban environments and discuss what these places may sound like, stressing that we do not all hear the same sounds or attribute the same meaning to them. The complementary activity consists of a soundscape composition inspired by a school day, made with audio from the Internet edited with Audacity (*El Principito*) or recreated with instrumental, vocal or body sounds (*Tu friso sonoro*). This latter unit and *Los sonidos de mi entorno* connect sound experimentation with the use of unconventional symbols, in the form of pictograms of objects, beings, and actions – animals that can be found on a visit to the zoo (Figure 5) or the four natural elements (Figure 6). In both cases, the target students are free to choose the sound sources to complement the musicograms: Orff instruments, body percussion, onomatopoeia, noises produced with everyday objects, etc.

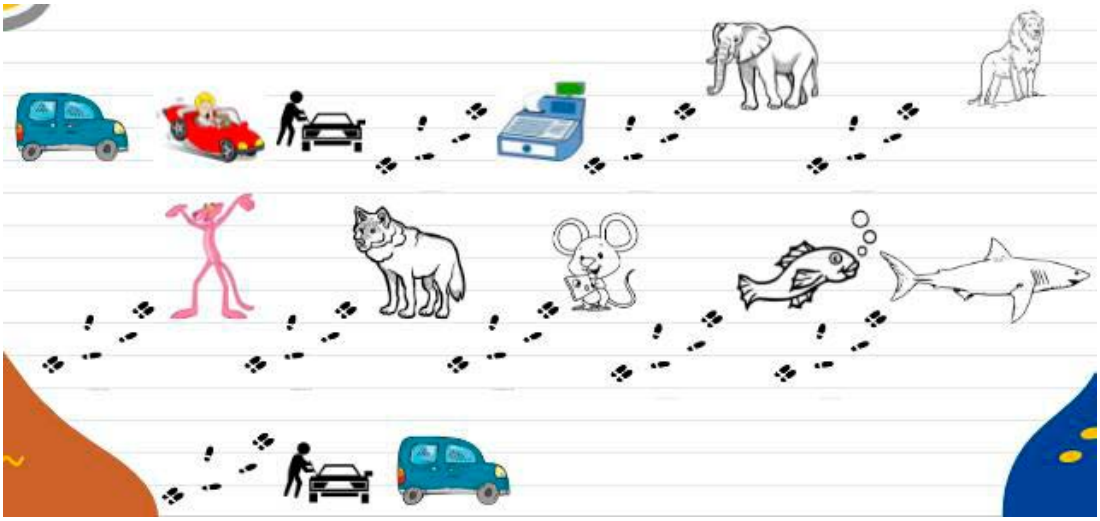

Figure 5. Musicogram of the unit *Tu friso sonoro*.

Figure 6. Musicogram of the unit *Los sonidos de mi entorno*.

Regarding improvisation, four units (31%) associate this practice with interactive ICT such as Toy Theater/Composer, Chrome MusicLab and IncrediBox. *La oreja de Vang Orff* uses Chrome's Rhythm and Melody Maker tools: while one student improvises a rhythmic-melodic sequence, the rest accompany it with Orff's body percussion diagrams. The same model of activity is used with IncrediBox: by playing with the application's avatars, the students improvise bodily sounds to accompany the beatbox rhythms. A more experimental use of Chrome MusicLab can be found in the *Mi gran viaje musical* unit, one of whose activities, "Let's measure waves", is based on the intention to develop senses other than hearing. Through the Spectrogram option, a first practice observes how waves move according to the chosen timbre. This is followed by an activity in which students draw the waves on the blackboard according to the sounds reproduced by their classmates with the application or with Orff instruments (Figure 7).

On the other hand, of the nine units that use ICT in the activities, only two (14%) use an application such as Kahoot to design activities to reinforce theoretical content, with no connection to practice.

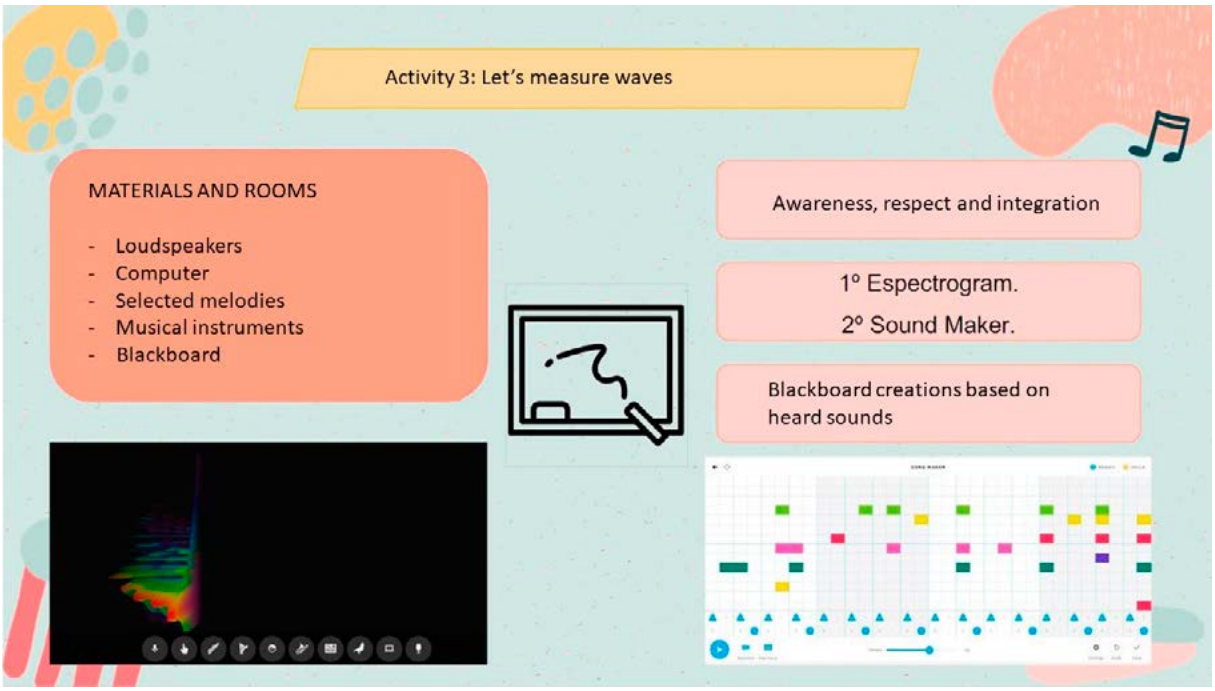

Figure 7. Chrome MusicLab activity of the unit *Mi gran viaje musical*.

Two other units are worth highlighting in terms of experimentation with noise or certain acoustic phenomena: *Pinceladas musicales* and *Los sonidos de mi entorno.* The first includes an activity ("Sounding cans") in which the students must put an object in a can; by shaking it, the others must discover what kind of object it contains or describe its qualities. A complementary activity uses these cans as a tool for measuring space: while some students make sounds with them, others, blindfolded, must go to meet them, guided by the timbre discrimination. In *Los sonidos de mi entorno*, the activity involves using auditory illusions such as the so-called *Shepard tones* to introduce the concept of the musical scale, asking the students to indicate when they perceive the ascending sound curve has begun.

Curricular areas involved in the proposals

Artistic education (music)	*La rítmica y la expresión corporal* *Pinceladas musicales* *Tu friso sonoro*
Other courses	*La oreja de Vang Orff* (Música y Plástica) *El Principito* (Música y Plástica, Lengua, Francés, Valores Sociales y Cívicos) *Las cualidades del sonido* (Música y Plástica, Ciencias de la Naturaleza) *Música para nuestros oídos* (Música, Lengua, Valores Sociales y Cívicos) *Música y movimiento* (Música y Plástica, Educación Física, Lengua, Ciencias Sociales) *Tu vida en sonidos* (Música y Plástica, Lengua, Educación Física) *Sensaciones musicales* (Música y Plástica, Lengua, Educación Física) *Mi gran viaje musical* (Música y Plástica) *Los sonidos de mi entorno* (Música y Plástica, Ciencias de la Naturaleza) *EmocionArte* (Música y Plástica, Educación Física, Ciencias Sociales)

Table 2. Areas and courses that integrate the students' didactic units.

Of the 13 units, 10 (77%) propose interdisciplinary activities between various courses of the Primary School syllabus, and the remaining three (23%) are programmed exclusively within Music. The most present area is Art Education; Music and Plastic Arts (69%) follows, then Spanish (38%), Physical Education (23%), and Social Sciences, Natural Sciences and Social and Civic Values (15%). It is worth highlighting the established interdisciplinary axes and the type of activities that link the courses through sound. How students approach the connection between sound expression and plastic art revolves around expressing emotions and feelings aroused by sound. Thus, four units (*La oreja de Vang Orff, Música y movimiento, Sensaciones musicales and EmocionArte*) include activities such as listening to songs or soundtracks and associating their possible meanings with a particular colour and emotion, as well as free drawing based on an Orff instrument improvisation.

The relationship with the Spanish course takes different forms. In *El Principito*, the reading of Antoine de Saint-Exupéry's story is accompanied by the recreation of each planet's soundscape, and the behaviours associated with each inhabitant (Social and Civic Values). In *Música y movimiento*, the students improvise a melody using Toy Theater and create two-verse lyrics to apply to it. In the units *Tu vida en sonidos* and S*ensaciones musicales*, the language content is tackled through the sound story, emphasising the students' freedom of experimentation. The proposed activity consists of creating a story in a group that includes sounds, onomatopoeia or noises; one of the members will read the story aloud and the other three will accompany it with any type of sound. All body parts are valid for generating sounds and a few instruments are provided for activity completion.

Other interdisciplinary connections are easy to deduce. For example, the relationship between Music and Physical Education is practised through corporal expression (Dalcroze, Orff, Patricia Stokoe, etc.) and soundscape links to courses such as Social Sciences or Natural Sciences.

Of the 13 units set, the one that achieved the most transversal profile was ¡*Música para nuestros oídos*!, which links sound and music levels with the areas of Spanish and Social and Civic Values. Inspired by Hormigos (2020), this unit aims to understand and analyse the most popular current songs through a theoretical, practical, and contextualised framework. The aim is for students to develop critical thinking towards the music they listen to in their daily lives in order to assess the behavioural models they transmit to the listener. Starting with a selection of the five most listened-to Spanish songs in 2021 on Spotify, they analyse the lyrics, rhythmic patterns and chords and then recreate the songs using Learning Music (Beta) and ChordChord. Finally, each group makes a podcast with Audacity where they present an analysis of the song with the following sections: musical introduction created using the applications; biographical data on the artist; analysis and description of the song's genre; rhythmical analysis; lyrical analysis; and reflection on the possible sexist and chauvinistic messages conveyed by the song.

Types of music education activities

Auditory discrimination	*El Principito* *Las cualidades del sonido* *¡Música para nuestros oídos!* *Música y movimiento* *Los sonidos de mi entorno* *La oreja de Vang Orff* *Pinceladas musicales* *Tu friso sonoro* *Tu vida en sonidos* *Sensaciones musicales* *Mi gran viaje musical* *EmocionArte*
Vocal expression	*Las cualidades del sonido* *Tu friso sonoro*
Instrumental expression	*El Principito* *Las cualidades del sonido* *Tu friso sonoro* *Los sonidos de mi entorno* *Tu vida en sonidos*
Bodily expression	*La rítmica y la expresión corporal* *Las cualidades del sonido* *Música y movimiento* *La oreja de Vang Orff* *Pinceladas musicales* *Tu friso sonoro* *EmocionArte* *Los sonidos de mi entorno*

Table 3. List of the didactic units according to the areas of music education covered by the activities.

Regarding the type of music education activities, practically all the units (92%) include auditory discrimination. This is combined with physical (61%), instrumental (38%) or vocal (15%) expression activities, without distinguishing between them. This suggests that our students conceive musical learning as a continuum between listening and producing sounds using all available resources (instruments, body, objects, etc.).

Disregarding classical methodologies such as Dalcroze, the relationship between auditory discrimination and corporal expression is well observed in the units *Música y movimiento* and *Los sonidos de mi entorno*. In the former, one of the activities consists of playing instruments in the classroom while some of the students, blindfolded, must find the previously assigned instrument. In the second, different animal sounds are played and the students, also blindfolded, move faster or slower depending on what the sounds transmit to them (agitation or calm).

Other units (*El Principito, Tu friso sonoro, Los sonidos de mi entorno*) use soundscape as a stimulus for instrumental expression, asking students to recreate the sensations aroused by reading the tale or looking at an image. Tu vida en sonidos includes an activity enti-

tled "Dubbing actors", in which sounds corresponding to an action must be added to a muted visual resource using Orff instruments. The activity supposedly verifies the relationships between what is seen and heard, on the basis that each student will establish this correspondence according to their experiences.

Música y movimiento, La oreja de Vang Orff, Sensaciones musicales y EmocionArte connect auditory discrimination with plastic art expression, a relationship already mentioned in the section dealing with the courses involved in the units. In this way, the reading-interpretation process of traditional teaching is inverted and, starting from active listening, we arrive at drawing-writing to get the students to trace what the sound conveys to them.

Ideas for activities to integrate the diversity of SEN students

Although 10 of the units (77%) include a specific section addressing diversity and include cases of ASD, ADHD, Down's syndrome, and deafness, only two of them (15%) were able to design sound experimentation activities to integrate cases of the latter. In *El Principito*, the introductory activity to the soundscape is a debate on how a series of landscapes shown in photographs (a beach, a forest, the school playground, etc.) would sound, focusing on the question of whether we all hear the same thing. According to the unit's authors, when talking about sounds, the teacher will always emphasise what they hear and how they feel during this process, as we do not all hear and feel sounds in the same way. The main objective is to allow students to develop a different perspective of music where nothing is right or wrong, merely subjective.

In *Mi gran viaje musical*, the senses of touch and sight are used to integrate hard-of-hearing students. Four related activities are as follows. In "Let's feel the music", the classroom loudspeakers are turned to face upwards and students are asked to touch the membrane and verbalise the type of vibrations it transmits. The second activity, "Let's observe the music", pursues the same objective but uses salt or chalk powder on a sheet of paper placed on top of the loudspeaker. In the third activity, "Let's transmit the music", the students stand in single file and each one transmits a rhythmic pattern on their partner's back. The last activity is the aforementioned "Let's measure the waves" where, using Chrome MusicLab, the aim is to develop senses other than hearing to perceive and understand sound.

Conclusions

Teaching soundscape and improvisation with non-specialist students of Music Education allows us to revise the traditional approach to music as technical knowledge linked to the ability to read a score correctly, for which prior talent or training is necessary. The presented resources help develop a broader meaning of making sound, conceiving it as an experiential activity in which we can all take part without needing specific knowledge. In this sense, an aspect that is common to all the units designed by the students of *Music and Its Didactic Application* is that none of them uses standard notation to teach theoretical con-

tent such as sound qualities or to design practical activities. In several cases, the emphasis is on improvisation based on visual stimuli or the use of ICT to playfully explore different types of sounds, regardless of whether they are considered musical. The students used software such as Chrome MusicLab, IncrediBox or Learning Music (Beta), which allowed them to improvise sound parameters in real time without having to go through written coding.

The combined analysis of the 13 teaching units shows that students were able to incorporate soundscape and improvisation resources, relating them to other areas of the curriculum and, occasionally, as a tool for the inclusion of hard-of-hearing SEN students. The units' interdisciplinary approach is reflected, among other examples, in the sociological analysis of the impact of commercial music on the acquisition of cultural or gender prejudices (*¡Música para nuestros oídos!*), the work on values education based on the understanding of a literary text and the sonorous expression of certain moral attitudes (*El Principito*), or the visualisation of a signal's acoustic fingerprint to explore other senses in sound perception (*Mi gran viaje musical*).

On the other hand, many activities incorporate listening to sound environments and recreating them through different instrumental, physical, or vocal sounds without distinguishing between the means of sound production and relying on alternative visual representations that imply a wide margin of freedom for experimentation. This reinforces the premise that each person listens differently to the surrounding environment and that this reality can be used in music education to foster an individualised approach to music. This is also observed in those units that connect listening with the expression of emotions and feelings or explore other mediums, such as new graphics or the visualisation of acoustic waves for a better understanding of sound.

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