

Technology and Music Production in Different Genres:

Key Issues for a Significant Music Education

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Abstract

This research stems from the assumption that knowing how sound technology works, as well as its features and limitations, can help us better understand the mainstream music styles and genres of the last decades. Consequently, the evolution of music recording is explored through a grounded analysis based on both published documents and on interviews with currently active music producers who are specialists in urban pop music, with the aim to collect enough data to support the need to increase the presence of sound technology in the teaching plans of Compulsory Secondary Education. After the data analysis, several didactic proposals are presented involving the introduction of these technologies in secondary education. Thus, the aim is to update formal music education for teenagers and facilitate their informed and critical point of view so they can apply it to their own music consumption.

Keywords: *Sound Technology, Music Recording, Urban Pop Music, Music Education, Music Styles, Music Genres*

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Introduction

In the 21st century, the first thing that comes to mind when thinking of adolescence and music is mainly mainstream music. Many research studies confirm that urban pop music styles are the macrogenre preferred by the youth¹ (AUTHOR 1, 2020); specifically, those recorded in a studio, through music production processes, and following the demands of the record industry market (Pouivet, 2010).

In this context, sound technologies have played a crucial role in the definition of sound trends in different times (Théberge, 1997) as, with each advance, new creative horizons have arisen for both musicians and producers (Homer, 2009) which have ended up establishing sonic clichés typical of “modern” music styles and genres (Aucouturier & Pachet, 2003). From the transgressive attitude of Punk to the hedonism of Trap and the claims of Hip-hop, the lechery of Reggaeton or the anguish of Grunge, each of these aesthetical features related to these music styles have been associated with a genuine sonic style of their own (Melchiorre & Schedl, 2020).

Urban pop music styles have progressively been introduced in the curricula of Compulsory Secondary Education (henceforth ESO, following the Spanish ‘Educación Secundaria Obligatoria’) (Rodríguez, 2004), thus taken in consideration almost on the same level as classical and traditional music (Wise, Greenwood & Davis, 2011). However, the historical approach to those music styles, besides considering their necessary contextual issues, is tackled from the point of view of musical language, the repertoire, and the main authors, without considering the sound recording technology which, nevertheless, has been crucial in the evolution of these styles (Baker & Green, 2013). Thus, their pedagogical aims would not have been grounded solidly but for the scientific community’s claims regarding the inclusion of urban pop music in formal education (Flores, 2007).

On the other hand, in music education, part of our recent history cannot be explained without the role of technology (Delalande, 2004). This relation between music and technology comes in the shape of software available in our computers and mobile phones, both for playing audio and video and for simulating, presenting information or searching for information (Gorgoretti, 2019). Technology has also been of use to transcend cultures and reach a massive audience through the adaptation and optimization of opportunity costs.

In this sense, readjusting curricula and including digital technologies in music teaching and learning processes are increasingly claimed for (Soutcott Y. Crawford, 2011; AUTHOR 2 2021). This re-adaptation caters for the students’ current needs, among which we can find media outlets to learn, create or imagine new contexts (Kim, 2016). Students are connected to the world through increasingly sophisticated mobile phones (Kongaut & Bohlin, 2016) and tablets used as sound generators, recorders, managers and editors (Stephenson & Limbrick, 2015). These students are, in a nutshell, digitally (Hagood & Skinner, 2012) and multimodally (Gainer, 2012) literate, so their digital education demands are higher.

The use of technology in ESO applied to music education has been proven to be beneficial when matching classroom experiences with students' personal interests (Gertrudix & Gertrudix, 2014). Some examples, are, for instance, video games (Countryman & Rose, 2017) as well as activities stemming from tutorials, like the ones analyzed by Chan et al. (2006). As Carlisle (2011) proposes, new interpretative experiences could be carried out in the classroom where the type of music adolescents listen to is present. This music often comes from several media and social networks used in the 21st century, which facilitates the creation of classroom multimodal experiences where both audition and creation are present.

Nevertheless, Savage (2010) stated that, in the United Kingdom, digital technology is mostly used to reinforce traditional contents, thus limiting or even wasting its potential. In addition to this, some schools are digitally under supplied (Crawford, 2009) and some educational curricula do not include the existing social recognition of the use of technology in teaching and learning processes (Crawford & Southcott, 2017; Pepler, 2010; Liu & Liu, 2017).

The present study focuses on the musical and education reality of western urban societies although there exist other ways of living and thinking of music and education that should not be disregarded as the world as we know it nowadays is experiencing a rapidly growing globalization process. Knowing the western urban cultures should serve to take advantage of its positive additions and to compensate for the potential and gradual dissolution of local cultures due to its influence (Laovanich & Chuppunnarat, 2016). Consequently, through bibliographical research and the analysis of interviews with sound recording professionals, this paper aims to, first, shed light on the relevance of technological advances and on the historic evolution of urban pop music styles in the 20th and 21st centuries, and, second, to suggest a series of grounded didactic proposals for formal music education contexts that facilitate the access to those kinds of music styles so that adolescents can get to know and understand them better. This paper has, therefore, two main aims:

- To get to know the importance of technological advances in the definition of different urban pop music genres.
- Based on the above, to propose improvements in the ESO formal music teaching that include technology.

Methods

This research follows a qualitative approach of an interpretative nature. With this aim, a phenomenological descriptive method was adopted to gather the participants' experiences. Following an inductive procedure, both the essential and the subjective aspects of the participants' experiences have been emphasized, thus exposing what is relevant and significant in their perceptions, emotions, and attitudes (Massot, Dorio & Sabariego, 2004).

With this aim, five music producers were interviewed as they were considered key agents in the music recording industry. The selection of participants followed a deliberate non-probabilistic sampling method (Martínez, 2007) following these criteria.

The interviewees:

- work on mainstream music,
- have worked for some major record label,² and
- are currently working in the music industry.

All the interviewees participated on their own will, signing an informed consent. Their data were coded to preserve their anonymous status and the confidentiality of the results (Universidad de Barcelona, 2010).

Semi-structured interviews were conducted with the participants. This allowed the access to evidence otherwise difficult to obtain through other means, as they include beliefs, opinions, and values. The interviews were conducted following a plan, with a pre-established, sequenced, and paced script (Ruiz, 2003). To design it, several documents on music production were analyzed, contrasting this information with teachers from the Universidad de Barcelona and from the ESMUC.³

The items were written paying special attention to their clarity, simplicity, and relevance, and were organized following criteria related to dimensions, categories and subcategories meeting the aims of this type of research. So as to validate the interview, and following Porta & Ferrández (2009), a preliminary version was evaluated by six teachers from XXX (anonymized for blind peer review). From their observations and a pilot study with a producer, the final version of the interview was composed,⁴ with 30 questions.

During the interviews, the interviewer played a non-participant role and used a non-directive technique so as to keep a trusting atmosphere (Massot, Dorio & Sabariego, 2004). This allowed the researchers to obtain valid and reliable information (Martínez, 2007), thus making sure that it was not contaminated by the researcher's interventions (Ruiz Bueno, 2014).

The data were gathered in a planned, systematic, intentioned, and objective way, so that the information could be verified as scientifically objective (Martínez, 2007). The interviews were audio-recorded and transcribed for analysis purposes.

As the questions were open, the quantitative analysis of the data followed a 5-step procedure, similar to the one used in the *ATLAS.TI* software:

1. Transcribing the interview and classifying the contents to discern the irrelevant and the relevant information.
2. Deciding on the key issues, associated to quotes selected among all the answers.
3. Grouping of all the key concepts in dimensions, categories and subcategories.
4. Elaborating a mind map to relate emerging key concepts, dimensions and subcategories.
5. Analyzing the data.

Results and Discussion

What follows is a summary of the interviews with the producers. More specifically, the common issues are exposed, while contrasting them with specialized references related to music and sound technology fields.

Technology and Music Genres

The interviewed participants highlight the application of sound advances in sound recording when defining the various urban pop music genres while referring to the very essence of recorded music. In that sense, the tools found in a recording studio, both physical and virtual, determine the musical identity of any piece. For instance, participant C describes the case of EDM –Electronic Dance Music– and its relationship with the voice chopping sound processing technique:

The sign treatment nowadays is part of the creative process [...] In the most mainstream EDM [...] voice chopping, which is an editing treatment that seeks to distort the human voice, is the element that defines an EDM song, this being what is most valued out of the whole creative process (C, question 5).

This idea sets an essential difference between the recording of a specific performance, rendering a faithful record of the musicians' performance, and the recording aiming to create a new phonographic work from a musical sketch. This concept stems back from the very invention of sound recording when its author, Thomas Edison, already considered this technology to be an instrument capable of creating music and that "would usher in a new era of artistic production" (Milner, 2016:42).

Later, with the emergence of the electric recordings in 1924, Stokowski suggested the evolution that would mean outdoing the original compositions and performances to make musicians' dreams come true: an even more vivid and beautiful kind of music; the one he had only heard in his own mind (Stokowski, 1946).

According to the interviewees, creative emergence is linked to the dissemination of recording technology, which dates back to the 50s. This meant a new way of making music which was adopted by both the artists of that time and those of later generations, such as The Beatles, which from the 60s on would work in a recording studio (Martin & Hornsby, 1994). From the experimentations in such studios new genres emerged that depended on the advances in recording technology, such as multitrack recording, editing, re-recording, etc. The grounds of those advances were founded even before, in the mid-1930s, when Les Paul developed the re-recording technique. The term sound on sound was coined back then. It was a methodology that allowed overlapping layers until obtaining a new music piece. From then on, just one person would be able to play the kind of music they had imagined, overcoming the limits of time and space. At the same time, Les Paul also experimented with reverberation, or the different effects achieved by relocating microphones.

As technology advanced, new sounds started consolidating that matched the features of each time, aesthetics, attitude and way of thinking of each music genre. Participant D exemplifies the link established between technology and ideology in some music styles:

In Hip Hop, an urban genre with a code, a dress style, a philosophy... sound aesthetics is crucial [...] For years, it had a rather unpolished sound. As it was not mainstream, hip-hoppers had limited resources [...] they were trying to, in a way, state that "I'm

a street kid..." [...] So, that unpolished sound is a sort of code shared by all those related to that genre. Something similar happens with Indie music. From the start, it was qualified as "lo-fi" music. It was deliberate, that is "we want our sound to be murky, we don't want it to be perceived clearly," which is the opposite you would do with a mainstream producer in a studio. What kind of attitude is that? It is: "we are independent," "we don't want to follow the mainstream music steps." We could also talk about other genres: Rock, Punk... endless examples closely linked to the artist's attitude (D, question 9).

At the same time, when it comes to disseminating music, the technological advances also contributed to the creation of new sonic trends. For example, at the beginning of the 60s, the American radio station WABC established a new broadcasting style for Rock and Roll: the "color radio." It was a type of sound that the engineers in this radio loaded with reverberation by means of processors (Milner, 2016).

This trend propelled an increasing demand of resounding records. Phil Spector consolidated the "Wall of Sound" technique, which gave recordings a feeling of unprecedented power to date. Layers and layers of sound, mixed with a large amount of reverberation that created a kind of sound with no parallel in the real world (Ribowsky, 2000). This sound left such a mark on the adolescent audience that Tom Wolfe called Spector the "tycoon of teen." Thus, the interaction between artists and music producers has led to associations of styles and specific sound techniques. Music production handles technical resources to create music recordings to meet specific goals, such as defining an artist's artistic profile and optimizing any piece for the music industry. In sound engineer Moses Ash's words, "the producer reconstructs what happened in the studio to fit somebody's idea of what it should" (Ash; quoted by Milner, 2016:104). This commercial vision implies the need of formulas that can guarantee success. According to those interviewed, this success partially depends on the fact that consumers can easily recognize what they are looking for: stable sonic models. With this aim, production will reinforce the elements that make it easy to identify a music genre or style explicitly. The history of these modern music styles and genres is inseparably linked to the history of production and sound technologies, in a tandem where it is impossible to determine which one first influenced the other.

Sound Capture

Innovations in microphonics, amplification, space acoustics, etc. has determined the sound of different music periods. Consequently, as the interviewees point out, at present, a music producer is capable to reminisce a given decade by means of resources that emulate technical features of the past. One example of this "production archaeology" would be the case of Daptone Records, famous in the mid-2000s, coinciding with the release of Amy Winehouse's *Back to Black*:

What they did there, to capture the sound aesthetics of the Soul of the 60s, was to record live [...] with the same microphones, guitar and bass amplifiers they used to use, they organized the drums set in the same way, used the same pads... All that is crucial, so it sounds like in the past (D, question 20).

This record label is inspired by Motown, whose productions gave prominence to voices, placed the drums at the back and used reverberation in a very specific way (Landau, 1971). This sound became the symbol of almost all the 60s Soul and R&B productions.

Sound Editing (Duration and Pitch)

According to the participants interviewed, most of the music addressed to adolescents has a socializing function, such as the dancing sessions, where several songs must be played in a continuum, overlapping with each other. The DJ, in charge of “dropping” these tracks, has the necessary tools to adapt the tempo of each song so that it coincides with and can be overlapped with the following one. But it is on the Producer to make sure that the same beat is kept all throughout a song. With that aim, they resort to “quantization,” an editing process that allows the temporal relocation of sounds and their adaptation to a reticle based on the predictability of the beats and metrics of any song, as participant C says:

Songs can have two types of beats, a human beat or a mechanical beat [...] In the mechanical beat you adhere to a clapperboard [...] A pop or rock group mechanizes it [...] Other styles don't. There's the case of loop or Groove, present in most “black” music. R&B, Hip Hop, Soul, Acid Jazz... are cyclic, but follow a human beat. You loop a human performance, give it a mechanical cycle, and it automatically keeps the human beat, but it allows you to fit it together with machines (C, question 18).

Another sound element that can be edited is pitch.⁵ Pitch correction audio processors, such as the Auto-Tune, have become creative tools with aesthetic purposes used in most music productions aimed at adolescents (Danielsen, 2017) and are essential in styles such as Reggaeton or Trap, which have integrated electronic music production tools.

Its origin dates to the end of the 20th century, with the arousal of digital technology, which broadened the sound recording features almost unlimitedly. The DAW (Digital Audio Workstation) would become the main music recording and creation tool (Danielsen, 2017). This hardware and software combination would allow musicians to record, edit and mix sound digitally, making it easier for newcomers with music knowledge and different influences to incorporate their musical discourses in the recording industry and to establish new aesthetics based on the home studio sound (Harper, 2014).

Also, the interviewees explain how, in the current musical creation context, many songs are made collaboratively. These creations, made by different people in different places and times, must be assembled, which often requires the adaptation of the key in which the sound files are. This technique has led to the emergence of new sound trends, typical of Pop and Electronic Dance Music, where it is very common to hear dehumanized voices which sound even attractive to the audience's ears. The following example exposed by participant C illustrates this phenomenon:

The piece is a collage of things composed completely autonomously [...] For example, Martin Garix has a tune named “In The Name Of Love” where the voice sounds like “smurf-y” because that was recorded in a given key and then, as a collage, a new layer in a different key was added, and so they played with the key adaptor, and people don’t even care if it sounds like the Smurfs [...] Nowadays that’s a technique that is used even as a marketing strategy (C, question 26).

Audio Processing (Timbre and Sound Intensity)

Timbre Variation Processors

Several processors, among others, belong in this category. They are commonly known as equalizers or filters and modify the intensity of frequency of the signal processed. In this way, they can give a piece or a fragment a particular sound and character, for example, a vibrant or an opaque sound, among others. Quoting participant A:

If I need to transmit rawness, power, moodiness, energy, I’ll go for Sharp, aggressive, high-pitched or medium-pitched sounds. In contrast, if I need to transmit warmth and clam, I’ll go for sounds that are silkier, lower-pitched, less strident” (A, question 17).

These metaphorical associations between timbre and attitude have led to the creation of sound aesthetics linked to styles, genres and even musical eras:

In the 90s [...] with the appearance of Grunge and Britpop, there was a wish to go back to the 70s style. The sound is much more processed, in the sense of adding a murky feel (D, question 20).

Filters can also give priority to a range of frequencies, attenuating the rest. This process can be applied to specific fragments of songs and in a controlled way; for example, it is possible to set up the filter, so it applies the changes gradually or progressively. This technique is commonly used in certain styles to render certain passages more powerful:

For example, in Electronic or Dance music, or even in Pop [...], you can hear everything filtered as in David Guetta and, all of a sudden, the chorus comes in, you open it and you feel on a high. Or the typical technique, more typical of the 90s, of starting a song in radio mode and then the chorus sounds without the filter (A, question 9).

Dynamics Processors

Dynamics processors, among which we can find compressors, expanders, sound gates, etc., allow the manipulation of the dynamic range of any signal, the difference between its maximum and minimum intensity level. This can be of great help for listening to music in noisy social environments, which makes most of the music addressed to adolescents to be highly homogeneous in terms of dynamics (AUTHOR 3, 2020).

This fact is partly related to the changes in listening habits. The emergence back in the 90s of mobile phones with which music could be played created the need to adapt the sound in recordings so they could be played in noisy places. That made compression an indispensable tool (Katz, 2002). In addition, radio stations, right in the middle of the “Loudness War,” resorted as well to compression techniques to be able to offer the feel of higher sound power than their competitors (Devine, 2013). Some sound effects stemmed from that hyper-compression such as clipping (signal saturation), that would be used in Hip-Hop, Dance or contemporary R&B; or pumping⁶ which, some years later, would be deliberately used, for example, in the drops of EDM (Deruty & Tardieu, 2014). This phenomenon became more and more salient until 1999, known as the year of the square wave, when that ultra-compressed sound could also be found in other music genres, such as Pop, Rock or even Jazz (Milner, 2016).

Nevertheless, dynamics processing can also be applied for other purposes; for example, it is commonly used to stress attitude in Rap:

So that something sounds aggressive, [...] you need a type of compression [...] with very specific settings that highlights consonants and emphasizes the aggressive character of that attitude (C, question 19).

Another typical example of dynamics processing is in the use of sound gates during the 80s, which cut any other signal that does not reach a minimum intensity threshold. Combined with a reverberation sound, you simultaneously get a feel of grandiloquence and definition, typical of the drums in the 80s music.

Space Processors

Space processors, such as reverberation or delay, are designed to imitate the sound of acoustic spaces although, all throughout the history of sound recording, they have been identified with the peculiar sound of specific sensations, attitudes or the imaginary linked to different music styles. In the case of reverberation, going back to the example of Wall of sound, this type of manipulation magnified the sound of Rock and Pop productions from the 60s on resorting to reverberation to make an impression of grandiloquence. Other genres, such as the New Age in the 80s, have also used reverberation, which gave them the mystical atmospheres and sensations that they wanted to instill in their listeners:

Reverberation is a resource used many times to give a feeling of amplitude [...] In the case of Enya, her sound transmits this feeling of “I’m in the middle of the sea, and I can only see the ocean all around me” and the song is about that. It’s actually the work on production, and not on the arrangements, that expresses that idea (D, question 11).

Delay, the processor which generates the repetition of a sound with a certain delay from the original, also has specific uses in urban pop music. Participant D explains the recurrent use of Slap Back (a specific set up of delay) in several music styles throughout time:

If I want to create a Rockabilly sound [...], Slap Back is used a great deal. It's a process that started being applied in the 50s [...]. It has also been used in the 80s, in Techno Pop, [...] and then in the 2000s. [...] It was also very much used in Glam (D, question 16).

There exist many other processors, such as distortion, flanger, phaser, chorus, etc. that could be grouped as special effects, all of which decisive in the construction of the sound identity of some music genres and styles.

Mixing and Mastering

This is the phase where the final touches will be given to the sound of recorded music and, therefore, the character of the songs is finally defined to establish a balance of levels between the recorded elements and to place their sound levels properly. According to participant A:

When mixing a song and choosing the levels for the instruments, you can cause a more aggressive feeling or attitude [...] by setting, for example, the guitars louder, the voice very present... In contrast, if you want to evoke a more Chill Out kind of feeling, you will put a great deal of reverberation, very little transitory elements, with just some attack, with compressors that make the attack softer [...], and in this way you already get this feeling of peace (A, question 10).

As it happens with timbre processors, metaphors linked to feelings, attitudes or emotions are used to refer to the sound of different types of mixings. For example, mixings are qualified as “raw” for the Punk Rock of the 70s/80s. As opposed to this “opaque” sound of the end of the 70s, in the 90s there was a predominance of sonic glow, typical of the digital era.

These associations between decades and sounds are often justified technologically. For example, in the 70s, magnetic recordings enlarged their capacity to record sound tracks printed on their tapes. The increase in the number of simultaneous tracks affected the quality and sound definition of the takes due to the overlaps. To overcome this flaw, the natural reverberation of the studios that prolonged and mixed the sounds was abandoned, so a new aesthetics with a dry sound was gradually established. It permeated in the audience and ended up defining the sound of the 70s, regardless of the genre, Rock, Funk or Disco (Milner, 2016). However, in the 80s, the recording industry bet for sounds more similar to sports stadiums and larger spaces, through the use of processors and effects. Also, the mixing boards could be connected to external equipment, which allowed even more effects, which also fostered a tendency to overproduction (Rotondi, 2011). Producer Andy Wallace clearly explains the trends in recorded music in the following years: “the band was almost defined by the style of recording and production, rather than having their own character” (Wallace; cited by Milner, 2016:142).

Once the mixing was ready, the resulting sound files are sent to mastering, where they will be optimized to be listened to in any other situation and using any other equipment. This process has made listeners to get used to new sound sensations,

usually comparable to the feeling of power. Consequently, some styles arisen in the last decades have also been defined by their mastering models. According to participant C:

In some cases, mastering completes the definition of the artistic profile [...]. Elements such as the drop, in EDM, are polished in the mastering, or the feeling of wall that we can find in Metal, or in Jungle, or in Frenchcore (C, question 9).

Nevertheless, the data gathered show how sound manipulation processes, during the production of urban pop music, are inseparable from their aesthetics and, therefore, define them and give them an identity of their own (see Figure 1's table).

| <i>Production Technique</i> | <i>Technological Resources</i> | <i>Style/Genre</i> | <i>Decade</i> |
|--|--|----------------------------------|--|
| Slap Back | Delay | Rock & Roll Rockabilly | 50 |
| | | Glam | 70 |
| | | Techno Pop | 80 |
| | | Indie | 2000 |
| Wall of Sound | Reverberation and track addition | Rock Pop | 60 |
| Motown sound | Leveling between tracks and reverberation | Soul R&B | |
| “Dry and opaque” production | Microphonics and “absence” of reverberation | Rock Pop Funk Disco | 70 |
| Home Studio sound | Portable or virtual recording devices | Hip Hop Indie | |
| “Raw” production | Distortion and equalization | Punk | 80 |
| “Hyper-production” | Reverberation, sound synthesis and noise gates | Rock Pop New Age | |
| “Dry, vibrant and aggressive” production | Microphonics, equalization and compression | Rock Pop Grunge Britpop | 90 |
| Voice “robotization” ⁷ | Pitch correction | Trap Reggaeton EDM Pop | Late 90s, 2000s and 21st Century |

Figure 1. Table of examples of production techniques associated to music styles, genres and decades. Derived from author's interview with music producers in this research study.

Didactic Proposal

The objectives of this research were to get to know the importance of technological advances in the definition of the different urban pop music genres of the 20th and 21st centuries so as to propose improvements in music education in secondary school including the technological dimension.

From the results obtained, which highlight the importance of recording processes and techniques in the definition of mass consumption music genres, we propose a

didactic sequence to be completed throughout an academic term, in 40 to 60-minute sessions consisting of theory and practice activities incorporating the DAW gradually and effectively in the Music subject of secondary education.⁸ To implement these activities, we recommend the use of one DAW – for instance, Reaper⁹ – which is intuitive, small sized, multiplatform (Windows, MacOS, Linux) and with undemanding technical requirements, so that it can work with most classroom computers. The students will be able to work individually or in pairs, and will have to have access to a personal computer with Internet and headphones. The tasks done will be shared in an online platform such as Google Classroom or Moodle so that the class group can evaluate them and comment on them. This way, it will also be easier to apply them in distance learning environments (Vela González, 2020).

Sessions 1 and 2: Historical Background of Music Recording

A brief historical overview of mainstream music will be presented through sound technologies. The different music styles that arose with the emergence of music recording will be reviewed, as well as the different music eras and the technological resources that have defined the different sounds present during the 20th and 21st centuries. Several listening sessions will take place so that students can learn to identify the most representative technological resources used in urban pop music. The DAW with which all the activities will be done in the sessions to follow will be presented.¹⁰

Session 3: Cutting Off a Song Passage

With the chosen DAW, the students will create an audio file from a song snippet. This snippet will have been cut off bearing in mind its internal harmonic/melodic structure as well as its rhythmic coherence. Once isolated, suitable fade-ins and fade-outs will be applied to the start and finish volumes.

By means of this activity, basic digital audio and acoustics concepts will be tackled and students will practice techniques to import and export and to edit (cut, move, delete) audio files.

Session 4: Linking Different Sound Fragments

Following the instructions of the previous activity, different sound fragments will be isolated and chained in just one file, one after the other, for example, so as to create series of music fragments for a choreography.

The concepts dealt with in the previous activity will be delved into and new concepts will be introduced, namely, basic mixing techniques (leveling and volume automatizations) and sequencing (audio fragments distribution in time).

Session 5: Creating a Looped Music Fragment

A fragment from a musical piece will be cut off so that it can be looped in such a way that the editing work cannot be perceived and keeping its rhythmic and harmonic/melodic coherence. In this way, the students can, for example, create an

instrumental base so as to sing over it if using urban music. For that purpose, the isolated fragment will have to be free of melody so that it can work as a base.

With this activity, the concepts previously tackled will be applied to a musical context, introducing concepts such as tempo, harmonic cadences or melodic motif, and music editing techniques will be practiced.

Sessions 6 and 7: Composing a Sonic Passage

We suggest the recreation of a sonic passage by combining isolated sounds either from sound banks¹¹ or recorded by the students themselves.

In this case, activities with multitrack format will be dealt with and simultaneous sounds will be tackled on different tracks. At the same time, signal processing will be delved into. With this aim, specialization sound techniques will be practiced, such as panning (the lateral distribution of sound), reverberation (the simulation of a physical space) and sound layers (the apparent distance between sound elements by manipulating their intensity), as well as the automatization of settings so as to create a feeling of motion.

Sessions 8 and 9: Recording an Audio-tale

The students will record themselves telling a tale and, later on, will add sound effects and background music to it.

New techniques will be implemented such as recording (which will be possible using mobile phones) and the use of pitch correction audio processors (which will allow the creation of different characters) and timbre variation processors to create radio effects, etc. In this way, the collective sound imaginary will be tackled through the analysis of sound clichés and sound and musical atmospheres.

Sessions 10 and 11: Creating a Remix

An alternative version of a song will be created. With that aim, several snippets will be cut off and reordered. One of those snippets will be instrumental and will be duplicated so that its length allows the recording of a singing or 'rapping' voice on top.

All the concepts and techniques will be practiced and applied in a musical context. In the same way, the work with processors typical of mainstream music consumed by adolescents will be introduced, such as the *Auto-Tune*. In this way, several stylistic features of different types of music will be examined in terms of sound and structure.

For the evaluation of all the activities, completed during 11 sessions, the students will have, in advance, a self-evaluation rubric (it will be a co-evaluation rubric if they have worked in pairs) which will allow them to know which items will be taken into account and how for evaluation purposes. Every student or pair will deliver an evaluation document for each activity. The teacher will also evaluate each activity separately, following the criteria in the rubrics. The final score will be calculated considering both the students' and the teacher's evaluation in each case.

Conclusion

From the present analysis and the interviews in this study, urban pop music styles, those preferred by adolescents, should be treated as mainstream music massively consumed in recorded format, that is, as music created by means of sound recording technologies so that they can be massively distributed in the recording industry. This dependency on technology has contributed to the definition of these urban pop music styles and genres of the last decades partly due to these advances in recording technology. Consequently, it can be affirmed that knowing the historical advances in technologies is essential to identify and understand the features of these types of music.

For all the exposed above, and in agreement with Flores (2007), we believe that teaching the techniques and procedures followed when recording these types of music will contribute to a better and thorough music education among adolescents, be it due to obvious motivational reasons (Galera, 2011), or due to the pedagogical virtues in terms of creativity, cooperative attitude and interdisciplinarity, thanks to the introduction of such technologies in a formal music education context (Marín-Liébaná, Magraner & Nicolás, 2020).

In the same way, understanding how recording production and the recording industry work will help adolescents to have a critical look towards mainstream music (Terrazas-Bañales, 2013). Through its networks and unfiltered marketing strategies, the recording industry influences the adolescents' audiovisual and musical consumption, as well as their ideologies and attitudes (North & Hargreaves, 2007).

Accordingly, the didactic proposal presented in this paper includes the DAW in ESO. With the emergence of digital recording, these types of software programs have become essential tools to create music consumed by adolescents. Styles such as Trap, Hip-Hop or Pop are possible thanks to sound manipulations facilitated by the DAW. Learning how to handle them will help the adolescents' music learning activities to sound like the current trends in music, which will make them more appealing and will foster their motivation (Fink, Latour & Wallmark, 2018). Besides, they offer the possibility of creating music pieces with surprising results without needing too much prior music knowledge (Rudolph, 2004) and make collective music creation easier, which fosters motivation and commitment in the students (Ocaña-Fernández, Montes-Rodríguez & Reyes-López, 2020).

After several weeks of class work using sound recording technologies, we intend to get adolescents to be familiar with music reality in a curricular context. Besides reducing the gap between formal and informal education (García-Peinazo, 2017), we intend to foster significant music learning among the youth that will allow them to build their own individual and collective identities (Rentfrow, 2012). Even so, there are limitations to this proposal: for instance, some of the most important music technology elements such as broadcasting means (radio, digital radio, CD, streaming, etc.) are not tackled and neither is sound synthetization, which was influential and relevant for understanding how music is produced nowadays, nor collaborative tools for music production, among many others.

Consequently, this proposal is presented as the starting point from which music education should continue being constantly redefined, in a world where the musical experience is increasingly technological (Williams, 2007). Thus, with the addition of new pedagogical perspectives and the indispensable contribution from our inherited tradition, a thorough and high-quality education will be ensured.

Endnotes

- 1 “Style” is considered in this text as the group of features that identify the artistic trend of a given time or genre. “Genre” is considered here as the concept that establishes formal differences considering the socio-musical context as well. Even so, in this paper both terms are used indistinctly.
- 2 Those record labels currently control about 70% of the recorded music industry, regarding worldwide sales (Insunza Aranceta, 2016).
- 3 ESMUC: Escola Superior de Música de Catalunya, is the public Music Conservatory in this region.
- 4 The final version of the interview can be found in XXX (AUTHOR 4, 2019) (anonymised for blind peer review purposes).
- 5 Pitch is included in the sound editing section as we consider the way the contents of recorded material is transformed, beyond its sonic texture, although technically speaking it is about audio processing.
- 6 The limiter mitigates all the frequencies jointly so the elements that generate intensity peaks, such as the low-pitched sound of a drum, can affect the other sounds, such as voices.
- 7 Using auto-tune for creative purposes became popular with the release of Cher’s greatest hit ‘Believe’ in 1998. Producers Mark Taylor and Brian Rawling opted for an aggressive Auto-Tune setting so that it was executed right when receiving the signal. This instantaneous tune correction involved a robotic effect in Cher’s voice. After the single’s great success, this production technique became a recurrent trend in many mainstream songs during the next years.
- 8 Although this didactic proposal could be implemented in any ESO grade, it is recommended for Grade 2 onwards as, if the official Spanish ESO curriculum has been followed (Royal Decree 1105/2014 - Ministry of Education, Culture and Sports, 2015:454), the students will have acquired basic computer technology and music concepts which will be of very much use for our proposal.
- 9 Available at <https://www.reaper.fm/download.php> .
- 10 See some examples in the table of sound resources available in XXX (AUTHOR 5, 2020) (anonymized data for blind review purposes).
- 11 Like the collaborative audio simples repository: Freesound, accessible online at <https://freesound.org/>.

References

- Aucouturier, Jean-Julien & Francois Pachet. “Representing Musical Genre: A State of the Art.” *Journal of New Music Research* 32, no. 1 (2003): 83-93. <https://doi.org/10.1076/jnmr.32.1.83.16801>

Author 1. (2020).

Author 2. (2021).

Author 2. (2020).

Author 3. (2019).

Author 4. (2020).

Baker, David & Lucy Green. "Ear Playing and Aural Development in the Instrumental Lesson: Results From A "Case-Control" Experiment." *International Journal of Music Education* 35, no. 2 (2013):141-159. <https://doi.org/10.1177/1321103X13508254>.

Carlisle, Katie. "Conceptualising Secondary Aurality and Its Impact on Possibility for Engagement of Children and Adolescents Within School Music Settings." *Music Education Research* 13, no. 2 (2011): 241-253. <https://doi.org/10.1080/14613808.2011.577766>.

Chan, Liz. M. Y., Ann C. Jones, Eileen Scanlon & Richard Joiner. "The Use of ICT to Support the Development of Practical Music Skills Through Acquiring Keyboard Skills: A Classroom Based Study." *Computers & Education* 46, no. 4 (2006): 391-406. <https://doi.org/10.1016/j.compedu.2004.08.007>.

Cleveland, Barry. *Creative Music Production: Joe Meek's Bold Techniques*. Nashville: Artistpro, 2001.

Countryman, June & Leslie Stewart Rose. "Wellbeing In The Secondary Music Classroom: Ideas From Hero's Journeys and Online Gaming." *Philosophy of Music Education Review* 25, no. 2 (2017):128-149. <http://www.jstor.org/stable/10.2979/philmusieducrevi.25.2.03>.

Crawford, Renée. "Secondary School Music Education: A Case Study in Adapting to ICT Resource Limitations." *Australasian Journal of Educational Technology* 25, no. 4 (2009):471-488. <https://doi.org/10.14742/ajet.1124>.

Crawford, Renée & Jane Southcott. "Curriculum Stasis the Disconnect Between Music and Technology in the Australian Curriculum." *Technology Pedagogy and Education* 26, no. 3 (2017):347-366. <http://dx.doi.org/10.1080/1475939X.2016.1247747>.

Danielsen, Anne. "Music, Media and Technological Creativity in the Digital Age." *Nordic Research in Music Education* 18 (2017): 9-22. <http://hdl.handle.net/11250/2490532>.

Delalande, François. "Musical Education in the New Technologies Age." *Comunicar* 23 (2004):17-23. <https://doi.org/10.3916/C23-2004-04>.

Deruty, Emmanuel & Damien Tardieu. "About Dynamic Processing in Mainstream Music." *Journal of the Audio Engineering Society* 62 (2014):42-55. <http://dx.doi.org/10.17743/jaes.2014.0001>.

Devine, Kyle. "Imperfect Sound Forever: Loudness Wars, Listening Formations and the History of Sound Reproduction." *Popular Music* 32, no. 2 (2013):159-176. <https://doi.org/10.1017/S0261143013000032>.

- Fink, Robert, Melinda Latour & Zachary Wallmark. *The Relentless Pursuit of Tone: Timbre in Popular Music*. Oxford: Oxford University Press, 2018.
- Flores, Susana. "Principales Acercamientos al Uso de la Música Popular Actual en la Educación Secundaria." *Revista Electrónica de LEEME* 19 (2007). <https://ojs.uv.es/index.php/LEEME/article/view/9763/9197>.
- Gainer, Jesse (2012). "Critical Thinking: Foundational for Digital Literacies and Democracy." *Journal of Adolescent & Adult Literacy* 56, no. 1 (2012):14-17. <https://eric.ed.gov/?id=EJ969434>
- Galera, Maria del Mar & José Mendoza. "Tecnología Musical y Creatividad: Una Experiencia en la Formación de Maestros." *Revista electrónica de LEEME* 28 (2011):24-36. <https://ojs.uv.es/index.php/LEEME/article/view/9828/9251>.
- García-Peinazo, Diego. "¿Nuevos "Clásicos Básicos" en Educación Musical? De la canonización a la Audición Activa de las Músicas Populares Urbanas en (con) Textos Didácticos Específicos." *Revista Electrónica de LEEME* 40 (2017). <https://doi.org/10.7203/LEEME.40.10914>.
- Gertrudix Barrio, Felipe & Manuel Gertrudix Barrio. "Tools and Resources for Music Creation and Consumption on Web 2.1. Applications and Educational Possibilities." *Educacion XX1*, 17, no. 2 (2014): 313-336. <https://doi.org/10.5944/educxx1.17.2.11493>.
- Gorgoretti, Basak. "The Use of Technology in Music Education in North Cyprus According to Student Music Teachers." *South African Journal of Education* 39, no. 1 (2019): 1-10. <http://doi.org/10.15700/saje.v39n1a1436>.
- Hagood, Margaret C. & Emily N. Skinner. "Appreciating Plurality Through Conversations Among Literacy Stakeholders." *Journal of Adolescent & Adult Literacy* 56, no. 1 (2012):4-6. <https://ila.onlinelibrary.wiley.com/doi/pdf/10.1002/JAAL.00093>.(accessed July 10, 2021).
- Harper, Adam. "Lo-Fi Aesthetics in Popular Music Discourse," doctoral thesis, Wadham College, University of Oxford, 2014. https://ora.ox.ac.uk/objects/uuid:cc84039c-3d30-484e-84b4-8535ba4a54f8/download_file?safe_filename=AHarper%2B-%2BLo-Fi%2BAesthetics%2BThesis.pdf&file_format=application%2Fpdf&type_of_work=Thesis. (accessed July 10, 2021).
- Homer, Matthew. "Beyond the Studio: The Impact of Home Recording Technologies on Music Creation and Consumption." *Nebula* 6, no. 3 (2009):85-99. <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.523.6877&rep=rep1&type=pdf>. (accessed July 10, 2021).
- Insunza Aranceta, Gaizka. "La Evolución de la Industria Discográfica: Un Análisis de los Procesos de Innovación en Europa," doctoral thesis. Universidad del País Vasco, 2016. <http://hdl.handle.net/10810/18845>. (accessed July 10, 2021).
- Katz, Bob. *La Masterización de Audio. El arte y la ciencia*. Andoain: Escuela de cine y vídeo, 2002.
- Kongaut, Chatchai & Erik Bohlin. "Investigating Mobile Broadband Adoption and Usage: A Case of Smartphones in Sweden." *Telematics and informatics* 33, no. 3 (2016):742-752. <https://doi.org/10.1016/j.tele.2015.12.002>.

- Landau, Jon. "The Motown Story: How Berry Gordy Jr. Created the Legendary Label." *Rolling Stone* (May 13th, 1971). Online. <https://www.rollingstone.com/music/music-features/the-motown-story-how-berry-gordy-jr-created-the-legendary-label-178066/>. (accessed July 10, 2021).
- Laovanich, Vitchatalum & Yoothana Chuppunnarat. "Music Education Students' Ways of Learning and Consumption of Cultures." *Journal of Urban Culture Research* 13, no. 1 (2016):108-127. <https://doi.org/10.14456/jucr.2016.16>
- Liu, Zhiyu & Yunna Liu. "Teaching Strategy and Instructional System Construction of Chinese National Instrumental Technology Education." *Eurasia Journal of Mathematics, Science and Technology Education* 13, no. 8 (2017): 5645-5653. <https://doi.org/10.12973/eurasia.2017.01018a>.
- Marín-Liébana, Pablo, José Salvador Blasco Magraner & Ana María Botella Nicolás. "La utilización de la Música Popular Urbana en la Educación Primaria y Secundaria." *Revista Música Hodie* 20 (2020). <https://doi.org/10.5216/mh.v20.63043>.
- Martin, George & Jeremy Hornsby. *All You Need is Ears: The Inside Personal Story of the Genius Who Created the Beatles*. Macmillan, 1994.
- Martínez González & Raquel Amaya. *La Investigación en la Práctica Educativa: Guía Metodológica de Investigación para el Diagnóstico y Evaluación en los Centros Docentes*. Madrid: Ministerio de Educación y Ciencia/ CIDE, 2007.
- Massot, Inés, Imma Dorio & Marta Sabariego. "Estrategias de Recogida y Análisis de la Información." En *Metodología de la Investigación Educativa*, Madrid: La Muralla, 2004. 329-366.
- Melchiorre, Alessandro B. & Markus Schedl. Personality Correlates of Music Audio Preferences for Modelling Music Listeners. In *Proceedings of the 28th ACM Conference on User Modeling, Adaptation and Personalization* (313-317). Association for Computing Machines, 2020. <https://doi.org/10.1145/3340631.3394874>.
- Milner, Greg. *El Sonido y la Perfección, una Historia de la Música Grabada*. Madrid: Lovemonk/Léeme Libros, 2016.
- Ministerio de Educación, Cultura y Deporte Real Decreto 1105/2014, de 26 de diciembre, por el que se establece el currículo básico de la Educación Secundaria Obligatoria y del Bachillerato. BOE (03/01/2015), no. 3, reference 37 (2015):169-546.
- North, Adrian C. & David J. Hargreaves. "Lifestyle Correlates of Musical Preference." *Society for Education, Music and Psychology Research* 35, no. 1 (2007): 58-87. <https://doi.org/10.1177/0305735607068888>.
- Ocaña-Fernández, Almudena, Ramón Montes-Rodríguez & María Luisa Reyes-López. "Creación Musical Colectiva: Análisis de Prácticas Pedagógicas Disruptivas en Educación Superior." *Revista Electrónica Complutense De Investigación En Educación Musical - RECIEM* 17 (2020): 3-12. <https://doi.org/10.5209/reciem.67172>.
- Peppler, Kylie. "Media Arts: Arts Education for a Digital Age." *Teachers Colleague Record* 112, no. 8 (2010):2118-2153. http://kpeppler.com/Docs/2010_Peppler_Media_Arts.pdf. (accessed July 10, 2021).

- Porta, Amparo y Reina Ferrández. "Elaboración de un Instrumento para Conocer las Características de la Banda Sonora de la Programación Infantil De Televisión." *RELIEVE* 15, no. 2 (2009):1-18. <http://hdl.handle.net/10234/25544>. (accessed July 10, 2021).
- Pouivet, Roger. *Philosophie du Rock; Une Ontologie des Artefacts et des Enregistrements*. París: Presses Universitaires de France, 2010.
- Rentfrow, Peter J. "The Role of Music in Everyday Life: Current Directions in the Social Psychology of Music." *Social and Personality Psychology Compass* 6 (2012):402-416. <http://doi.org/10.1111/j.1751-9004.2012.00434.x>.
- Rodríguez, Carlos Xavier. *Bridging the Gap. Popular Music and Music Education*. MENC, 2004.
- Rotondi, James. "The Enduring Legacy of SSL. Universal Audio." Universal Audio (web), 2011. <https://www.uaudio.fr/blog/the-enduring-legacy-of-ssl/>. (accessed July 10, 2021).
- Ribowsky, Mark. *He's a Rebel: Phil Spector. Rock and Roll's Legendary Producer*. Lanham: Cooper Square Press, 2000.
- Rudolph, Thomas E. *Teaching Music with Technology*. Chicago: GIA Publications Inc, 2004.
- Ruiz, José Ignacio. *Metodología de la Investigación Cualitativa*. Bilbao: Universidad de Deusto, 2003.
- Ruiz Bueno, Antonio. "Las Formas de Interrogación: La Entrevista." Diposit Digital de la Universitat de Barcelona (institutional repository), 2014. <http://diposit.ub.edu/dspace/handle/2445/51024>. (accessed July 10, 2021).
- Savage, Jonathan. "A Survey of ICT Usage Across English Secondary Schools." *Music Education Research* 12, no. 1 (2010): 89-104. <https://doi.org/10.1080/14613800903568288>.
- Southcott, Janes & Renée Crawford. "The Intersections of Curriculum Development: Music, ICT and Australian Music Education." *Australasian Journal of Educational Technology* 27, no. 1 (2011): 122-136. <https://doi.org/10.14742/ajet.987>.
- Stephenson, Jennifer & Lisa Limbrick. "A Review of the Use of Touch-Screen Mobile Devices by People with Developmental Disabilities." *Journal of Autism and Developmental Disorders* 45, no. 12 (2015): 3777-3791. <https://doi.org/10.1007/s10803-013-1878-8>.
- Stokowski, Leopold. *Música Para Todos Nosotros*. Buenos Aires: Espasa Calpe, 1946.
- Terrazas-Bañales, Francia, Oswaldo Lorenzo & Patricia González-Moreno. "Consumo Musical de Estudiantes Universitarios de México. Una Comparación Entre Alumnos de Distintas Facultades de una Universidad Mexicana." *Revista Electrónica de LEEME* 32 (2013). <https://ojs.uv.es/index.php/LEEME/article/view/9853>. (accessed July 10, 2021).
- Théberge, Paul. *Any Sound You Can Imagine: Making Music/Consuming Technology*. Middletown: Wesleyan University Press, 1997.

Universitat de Barcelona. *Código de Buenas Prácticas en Investigación*. Barcelona: Edicions de la Universitat de Barcelona, 2010.

Vela González, Marta. "Enseñanza de la Música Contemporánea a Través de Nuevas Tecnologías: Una Experiencia Pedagógica en el Aula Universitaria." *Epistemos* 8 (2020). <https://doi.org/10.24215/18530494e018>.

Williams, Andrew. *Portable Music and Its Functions*. Oxford: Peter Lang Publishing, 2007.

Wise, Stuart, Janinka Greenwood & Niki Davis. "Teachers' Use of Digital Technology in Secondary Music Education: Illustrations of Changing Classrooms." *British Journal of Music Education* 28, no. 2 (2011):117-134. <https://doi.org/10.1017/S0265051711000039>.