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El sonido como un elemento didáctico para el estudio del violonchelo

The Sound as a Didactic Element for the Cello Studies

O som como elemento didático para o estudo do violoncelo

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Resumen

El sonido es un elemento básico en el estudio de la música y tiene una técnica específica cuando de instrumentos de cuerda se trata. La finalidad de este estudio es presentar una propuesta metodológica que facilite técnicamente la emisión de los diferentes tipos de sonido en los instrumentos de cuerda, principalmente en el violonchelo para lograr la calidad del sonido como un elemento distintivo en la interpretación. Para esta investigación se utilizó el diseño de la teoría fundamentada, además de la técnica Delphi con un panel de 20 expertos de diferentes instituciones de enseñanza superior y conservatorios nacionales y extranjeros. El estudio fue de tipo descriptivo y analítico, lo que permitió abordar los diferentes métodos y las técnicas violonchelísticas utilizadas a través de la práctica docente para la mejora del sonido.

Dentro del proceso de diseño sistemático, se utilizó la codificación abierta donde las categorías se basaron en los datos recolectados de las entrevistas. Los resultados arrojaron que el control del arco y el vibrato de la mano izquierda definen la calidad del sonido que pueda emitir un violonchelista y se logra a través de ejercicios específicos y el control de peso. La variación del timbre y la intensidad del sonido se adquiere delimitando los

espacios físicos entre el puente y la tastiera y finalmente se aborda la preparación psicológica que se requiere para conseguir la expresividad y profundidad que debe de proyectar el intérprete.

Palabras clave: expresividad fisiológica, propuesta metodológica, técnica del sonido, violonchelo.

Abstract

Sound is a basic element in the study of music and has a specific technique when stringed instruments are involved. The purpose of this study is to introduce a methodological proposal that facilitates technically the emission of different types of sound in string instruments, mainly in the cello, to achieve the sound quality as a distinctive element in the performance. For this research we used the design of the grounded theory, based on this design we used the Delphi technique with a panel of 20 experts from different institutions of higher learning and national and foreign conservatories; the type of the study was descriptive and analytical, to address the different methods and techniques cellists used through the teaching practice for the improvement of sound. Within the systematic design process, open coding was used where categories were based on data collected from interviews. The results showed that the control of the bow and the vibrato of the left hand define the quality of the sound that can be emitted by a cellist and it is achieved through specific exercises and the control of weight. The variation of the timbre and the intensity of the sound is acquired by delimiting the physical spaces between the bridge and the tastiera and finally it addresses the psychological preparation that is required to achieve the expressiveness and depth that the interpreter must project.

Keywords: physiological expressiveness, methodological proposal, sound technique, cello.

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Resumo

O som é um elemento básico no estudo da música e possui uma técnica específica quando se trata de instrumentos de cordas. O objetivo deste estudo é apresentar uma proposta metodológica que facilite tecnicamente a emissão dos diferentes tipos de som em instrumentos de cordas, principalmente no violoncelo para alcançar a qualidade do som como elemento distintivo no desempenho. Para esta pesquisa, o design da teoria fundamentada foi utilizado, além da técnica Delphi com um painel de 20 especialistas de diferentes instituições de ensino superior e conservatórios nacionais e estrangeiros. O estudo foi de tipo descritivo e analítico, o que permitiu abordar os diferentes métodos e as técnicas violonchelísticas utilizadas através da prática de ensino para a melhoria do som.

Dentro do processo de design sistemático, a codificação aberta foi usada onde as categorias foram baseadas nos dados coletados das entrevistas. Os resultados mostraram que o controle do arco e o vibrato da mão esquerda definem a qualidade do som que um violoncelista pode emitir e é conseguido através de exercícios específicos e controle de peso. A variação do timbre e a intensidade do som são adquiridas através da delimitação dos espaços físicos entre a ponte e a tastiria e, finalmente, a preparação psicológica necessária para alcançar a expressividade e profundidade que o intérprete deve projetar é abordada.

Palavras-chave: expressividade fisiológica, proposta metodológica, técnica do som, violão.

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Introduction

Music is a human expression that has accompanied man since its inception, and causes tranquility, well-being and emotion, penetrating hearts through the creativity of sound and rhythm; In addition, it strengthens the affective and cooperation ties. "Music is the art of sounds. Since music is sound, the concern of any performer should be work on it "(Neuhaus, 2002: 63).

The sound is a sensation that is perceived by the ear when receiving the variations of pressure that are generated by the vibration of the sound bodies; it is transmitted through the air of the atmosphere and its qualities are: the height, which is the result of frequency, and a sound body, which is the number of vibrations per second and can be measured in Hertz, resulting in serious sounds , of less frequency, and acute, of greater frequency; the duration, which will correspond to the duration of the vibrations produced; the intensity, which refers to the force with which a sound is produced and is determined by the amplitude of the sound wave, that is, the greater the volume, the greater the amplitude of the wave; and the timbre, which is the quality that distinguishes different instruments or voices. Although the sound has the same intensity, duration and height, the sounds we hear are the result of a set of simultaneous or harmonic sounds.

The cello is considered the instrument most similar to the human voice because of the sound it emits. The first factor that captivates us when we hear an interpretation is the sonority that an interpreter is able to detach from his instrument. "Sound is everything: it transports emotion, beauty, vibration, intention. Without it, music is reduced to notes, more or less beautiful, more or less significant, but which do not affect us "(Hoppenot, 2002: 89).

The sound evokes memories and keeps us emotionally connected with our surroundings, since we are in the womb until the last moment we remain in this world. "Sound, in its purest and highest essence, is a vibratory bridge between us and the natural world" (Derbez, 2015: 29).

Many of the works of the great composers have been inspired by the sounds of nature, and also the sensitivity of the performer to produce their own sound is intimately related to their perception of the natural world through the senses. "The interpreter's conception of sonority reflected the inner attributes of man, his sense of harmony towards nature, his deep sense of spiritual peace" (Blum, 2000: 141).

Physical principles of the production of sound in stringed instruments.

The way of producing sound has a series of characteristics in which the instrumentalist himself directly influences. The control of the sound in the rubbed string instruments has to do with the point of contact, the speed and pressure that the bow exerts on the string, but also involves the left hand and the psychology of the performer.

The string, by itself, in its resting state does not produce any sound; For this string to produce a sound, first you have to tighten it and second you have to put it into vibration. This vibration needs a transmitting element towards the harmonic box that is used as amplifier of this sound, since by itself the string produces a sound, but it is so weak that it is barely perceptible by the human ear. The bridge serves to transmit the vibrations to the box, which is made of maple wood. The mission of this piece is extremely important, then, when coming into contact, its vibrations with the covers of the box (connected internally by a cylindrical bar called "soul") the sound is produced. The soul is responsible for distributing the vibration in a circular sense that establishes concentric waves from the soul to the outside.

It is the same effect that occurs when we throw a stone in a pond when the waters are in an absolute stillness: there is a series of concentric waves that are moving away and weakening and widening. This occurs from the soul, under the left leg of the bridge looking from the position of the performer. Under the right leg of the bridge, there is the harmonic bar, which is the piece of fir that is stuck longitudinally on the inside of the lid and its mission is very similar to that of the soul. All these vibrations, and the sound they produce, are enlarged inside the box and go out through the two efes that are the slits on both sides of the bridge.

Timber peculiarities of the sound in the cello

In any study about music, one of the most important elements is sound. The sound quality of an instrument (timbre) is determined from its manufacture, that is, it is not possible to modify the actual timbre but you can get the best of that sound through the proper use of the bow and vibrato. "The timbre is defined as the musical or vocal sound considered in reference to its quality, as acute or grave, sweet or harsh, strong or soft, clear or dull" (Meffen, 2001: 32).

The fundamental elements of sound control are an aspect to which a large part of the experts has given special importance, speaking of auditory self-control. The point of contact of the bow with the string is one of the factors that offers us a great variety of timbres as far as the sound of the cello is concerned. The space between the bridge and the beater can generate a huge range of timbre colors that we can use as if it were a painter who mixes the paints on his palette. "Through our handling of color and sound texture, a passage, for example, can have an expressive and bright character, or, on the contrary, introverted and somber" (Pleeth, 2001: 82).

The expressive possibilities when interpreting a work increase exponentially with the domain of this range of nuances. Similarly, the choice of a certain fingering on a string or another handling different positions, can modify the phrase from a timbral point of view. "The color of the sonority of each string explains the importance of fingerings" (Pleeth, 2001: 82).

Sound control, relationship with the point of contact and with the speed and pressure of the arch

The way of producing sound has a series of characteristics in which the instrumentalist himself directly influences. The control of the sound in the rubbed string instruments has to do with the point of contact, the speed and pressure that the bow exerts on the string, but also involves the left hand and the psychology of the performer.

> Thanks in large part to his masterful mastery of the three factors of the arcade that influence the production of sound, the speed in the movement of the bow, the degree of pressure exerted on the rope, the placement of the arch between the bridge and the mast , Casals was able to capture the particular essence of each musical mood (Blum, 2000: 129).

The nuance of sound is the main objective and essence of a cellist. The search for beautiful and beautiful sound is an obsession of a lifetime and sometimes this is not enough to achieve it. But without dramatizing too much, the search for the beautiful sound is something that must be cultivated from the beginning and never stop investigating in this sense. There is no doubt that a good school helps more to find a good sound than a bad one. The whole problem, or a large part of it, lies in the weight that will have to be used in the bow in order not to strangle the vibrations of the rope. "When the arc moves at high speed and with the lowest possible pressure, the sound result approaches the open vowel 'o'. With a higher arc pressure the result is comparable to the 'i' vowel "(Mantel, 2010: 87).

On the other hand, the pressure that is going to be used on the fingers of the left hand is also very important. This pressure will serve to get a clear sound, warm (depending on the intensity of the vibrato) and large (if we get a wide vibrato of regular oscillations). The sound may also vary, depending on how we place the fingers of the left hand. If we put our fingers something vertical, it will be useful for the realization of fast and clear passages in sonority, and if we knock them down a bit and use the fingertips, we can obtain a warmer and more beautiful sound.

Also the instrumentalist can produce a sound or another one playing near or far from the bridge. By approaching the bow you get a much more aggressive sound, even more metallic; moving the bow away, you get a more morbid sound no less powerful, which influences the speed and pressure. If we get too close, that vibration is interrupted or becomes unequal, which also alters the sound of the instrument. This is also done deliberately and is what is known as pontichelo sound.

> Within the confines of the small space between the bridge and the beater, there is the richest variety of nuances, textures and dynamics imaginable, from tender to hard sounds, through rounded and rough ones. We must understand these and know how to find and use them (Pleeth, 2001: 62).

Vibrato as a humanizing element of sound

“Vibrato is an integral part of sound and expression "(Bunting, 1999: 209). Vibrato is one of the most important elements for the beauty and greatness of sound. The number of oscillations must be changing, depending on the character or tempo in which you are playing. The vibrato is used to give colors to the different phrases, which can range from the aggressive to the dolce. "Whatever their character, the vibrato is permanently at the service of the affective content of the work, of a feeling that must be expressed" (Hoppenot, 2002: 102)

Finding a good vibrato is not easy, sometimes sinking speed in the left hand or otherwise. The fundamental thing is to find an elemental vibrato that magnifies the sound, to later mold it according to the aesthetic context of the composer and the work. "The timbres, within which, in a broad sense, vibrato and intonation have to be included in numerous instruments represent the texture, the 'fabric' of sound" (Mantel, 2010: 92).

Vibrato is a tool for expression, but its indiscriminate use can be subject to bad taste. Here intervenes the sensitivity of the interpreter to not make it the main source of attention, above the musical discourse. "The vibrato itself can not be expressive," Casals said, "because it depends on how it is applied. Vibrato is a way of expressing sensitivity, but not a proof of it" (Blum, 2000: 141).

The linking of sound with the left hand

In addition to the requirements regarding both the pitch of the bow and the vibrato there are two more prerequisites that are important for the production of a high quality sound and that are related to the left hand: the correct synchronization between the two hands and arms and the focalization of the sound in the string by means of the pressure exerted by the corresponding finger of the left hand. "The exaggerated pressure of the finger gives rise to a glassy, brittle sound, a diminution of the faculty of vibrato and impairs the volume of sound" (Flesch, 1995: 20).

Dynamics as an inherent element of sound

In music, the dynamics refer to the graduations of the intensity of the sound and it is also called dynamic or intensity nuance:

> The result obtained in music is related to the effect produced by chiaroscuro in the painting. Through a subtle juxtaposition of light and shadow, the artist can create the impression of perspective on the canvas, the figures seem modeled in third dimension. By shaping the intensities by means of dynamic contrast, the instrumentalist will emphasize certain points and place them in a close-up, achieving a sense of depth and relief in the musical line (Blum, 2000: 73).

Painting and music, sight and hearing. This comparison of arts and senses is very enlightening to understand the use of the variety of nuances in the sound of the cello. Students immediately understand that dynamic contrast is essential to transmit emotions.

Methodology

For this research, the design of grounded theory was used, which uses a qualitative systematic procedure to generate a theory that explains at a conceptual level an action, an interaction or a specific area (R. Hernández Sampieri, 2010: 492). On the basis of this design, a descriptive study was carried out to study the different methods and the violonchelísticas techniques used through the teaching practice for the first levels of

teaching of the instrument within the superior schools and conservatories of each country. Finally, within the systematic design process, open coding was used where the categories were based on the data collected from the interviews. The categories have properties represented by subcategories, which are coded (R. Hernández Sampieri, 2010: 494). The interview was semi-structured and the Delphi technique was used. All of the above was carried out according to the qualitative-inductive research approach.

The population was constituted by 20 specialists in the area of cello teaching as an instrument; the experts were chosen from different nationalities to have a broader picture and the countries that participated are: Mexico, Spain, Bulgaria, Poland and Russia. The teaching experience within the musical field is between 10 and 50 years.

The techniques used for data collection were the open interview verbally and online to each of the participants. The first stage was a pilot interview where, once all the experts' answers were received, the responses were categorized and systematized. In the second interview the subject of sound was raised with a total of 18 questions, it was again sent to the experts, the answers were received, the data analysis of the categories and subcategories was carried out. "The sampling was by saturation, where a selection of cases is made according to theoretical typologies in such a way that the information is not redundant" (Ruíz Olabuénaga, 2003: 45).

Analysis of results

The experts expressed four conceptions about sound, which were analyzed as categories and subcategories; the latter will be described along with the number of frequencies that were mentioned in the interviews; each specialist could comment on more than one important aspect, so the frequencies do not always show the total number of participants.
They are detailed below.

1) The elements that define the quality of the sound in the cello, with the following subcategories: that the arch goes parallel to the bridge (6); control of the arch and articulation of the left hand (12); a constant vibrato suitable to the sound (4); control of the weight and speed of the bow (5); the instrument itself (3)

2) Tools to improve sound, with the following subcategories: practice notes taken by releasing all the weight of our arms (9); rehearse double round string will help improve the sound (5); any relaxation exercise that promotes weight (6); experience a crescendo from heel to toe and a diminuendo from tip to heel (7); work the tip that is where there is less weight (4).

3) How is it possible to vary the tone and the intensity of the sound ?, with the following subcategories: touching the bridge or the tastiera (14); with the amount of pressure that we exert on the rope (2); with or without vibrato (10); using more or less rope (1); with the speed in the movement of the bow (3).

4) Mental preparation for the production of sound, with the following subcategories: thinking about producing a deep and expressive sound (12); allow the true sound to flow through the execution (4); to be in contact with sound through interpretation (8); create a broad and penetrating sound that reaches the audience (1); create a mental image before emitting the sound (6).

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Table 1. The sound.

Categorías y subcategorías		Frecuencias
Los elementos que define la calidad del sonido en el violonchelo	Que el arco vaya paralelo al puente	**6**
	Control del arco y vibrato en la mano izquierda	**12**
	Un vibrato constante y adecuado al sonido	**4**
	Control del peso y velocidad del arco	**5**
	El propio instrumento	**3**
Herramientas para mejorar el sonido	Practicar notas tenidas soltando todo el peso de nuestros brazos	**9**
	Practicar doble cuerda en redondas nos ayuda a mejorar el sonido	**5**
	Cualquier ejercicio de relajación que favorezca soltar el peso	**6**
	Practicar un crescendo de talón a punta y un disminuyendo de punta al talón	**7**
	Trabajar la punta que es donde menos peso hay	**4**
¿Cómo se consigue variar el tono y la intensidad del sonido?	Tocando al puente o a la tastiera	**14**
	Con la cantidad de presión que ejercemos sobre la cuerda	**2**
	Con o sin vibrato	**10**
	Usando más o menos cerda	**1**
	Con la velocidad en el movimiento del arco	**3**
Preparación mental para la producción del sonido	Pensar en producir un sonido profundo y expresivo	**12**
	Permitir que el verdadero sonido fluya a través de la ejecución	**4**
	Estar en contacto con el sonido a través de la interpretación	**8**
	Crear un sonido amplio y penetrante que llegue al publico	**1**
	Crear una imagen mental antes de emitir el sonido	**6**

Source: elaboración propia.

Discussion and results

In the first category, The elements that define the sound quality of the cello, we observe that most experts believe that the fundamental elements of sound control will be made with the bow and vibrato, that is, all the violonchelistic effects are controlled by variations in the dynamics, speed and amplitude of the vibrato.

The speed in the vibrato produces different colors in the sound and the dynamics are exercised with several aspects of the handling of the bow such as: speed, touching more or less near the bridge, exert more or less pressure on the string and play with more or less number of bristles

The dynamics written in the score will always be limited and subjective, and at that moment the sensitivity and the criteria of the interpreter come into play to bring the listener to a degree of sound coherence. "None of the signs that we have available in the usual notation of Western music can reproduce the exact acoustic process of a musical structure" (Mantel, 2010: 61). The interpreter should always keep an open mind to make music with the restricted information provided by the score.

> The written note, Casals says, is a straitjacket, while music, like life itself, is constant movement, continuous spontaneity, free from all restraint ... There are many excellent instrumentalists who are completely obsessed with the printed note, while it has a very limited capacity when it comes to expressing the real meaning of music (Blum, 2000: 82).

It is essential that the arch go parallel to the bridge, "in order to preserve the integrity of the contact point and therefore the integrity of the note's timbre, we will have to move the arch at right angles to the strings" (Bunting, 1999: 54). This is an aspect that must be taken care of because it directly affects the sound of the instrument according to the opinion of some of the participants.

Finally, the articulation of the fingers of the left hand will reverberate in the emission of the sound that in the case of music is similar to when we speak without a correct diction, the words do not reach the audience with clarity and interrupt the communication. "When the finger presses too weak, the strings are not shortened with sufficient precision so the sound is imprecise and bland" (Flesch, 1995: 20).

In the second category, Tools to improve the sound, the specialists mostly agreed that it is important to practice notes taken by releasing all the weight of our arms, to practice double rope in round ones to improve the sound, and any exercise is beneficial. relaxation that favors the release of weight, such as practicing a crescendo from heel to toe and decreasing from tip to heel.

Here we can see that reference is made to improve the sound by relaxing the arm and sliding the entire arc from the top to the bottom, which will help us to have a sound rich in sound and harmonics. "Release the weight of the right arm of the shoulder joint and, by means of a firm but sensitive arch grip, deploy this weight for the production of sound" (Bunting, 1999: 65).

The teacher has the challenge of making the student notice the importance of the sound he emits through his instrument. "The student should continuously monitor, during the study, his sound production, to try to discover and show the causes of each of his defects" (Flesch,1995: 6).

In the third category, how is it possible to vary the tone and the intensity of the sound? It was determined that the tone and intensity of the sound is varied when the bridge is touched or worn, evidencing that when playing closer to the bridge we will obtain a sound richer in harmonics and as we move away from the bridge, we will lose sound volume. "A string player, when performing a bow down, gets an unintentional diminuendo, because the bow accidentally slides down the neck. In the upper arch the opposite effect occurs, an unintentional crescendo, as the arch accidentally slides over the bridge "(Mantel, 2010: 62).

The control of the bow with respect to the line of the bridge is one of the factors that helps to modify the tone and the intensity of the sound, referring to the tone as the timbre of the instrument, which varies in each cello. Listening to the sound of each of the strings of the cello, we hear how it fades naturally in its course from the heel to the tip. We can appreciate that other variations of the sound derive from the original sound, which is very warm and gives us the possibility to mold it to our liking; in an orchestra it is sometimes required to play almost imperceptibly, for which it is a good resource to play the tastiera.

In the fourth category, mental preparation for the production of sound, it was found significant to think about producing a deep and expressive sound, allowing the true sound to flow through the performance, to be in contact with the sound through the interpretation, create a broad and penetrating sound that reaches the audience and be in contact with the sound through interpretation.

It is convenient to make a mental image of the sound we want to produce. Reflect to look for the sound inside a few seconds before producing it, it will help us recreate it by putting all our technical resources into action. "The challenge for our mind to imagine sound, implies a very beneficial exercise for the development of this quality" (García, 2017: 155).

At any time, anywhere we can analyze and plan our movements without touching our instrument. This type of mental practice is very useful and represents an area of opportunity in our daily study.

"Through mental practice we can imagine and operate on the various qualities of sound (tuning, tempo, duration ...)" (García, 2017: 92).

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Conclusions

After having conducted interviews with experts in the field, the following conclusions are reached: what defines the quality of the sound in the cello is the control of the arch and the articulation and vibrato in the left hand. The point of contact of the arch with respect to the bridge, the weight or the speed of the arch on the string or even the vibrato and the articulation are factors that define the quality of the sound that we produce. The strategies that we can use to improve the sound are the following: to practice having notes releasing all the weight of our arms. After a few months of practicing notes, we will obtain a great improvement in the quality of the sound. The tone and intensity of the sound can be varied by touching the bridge or tastiera. At the bridge we will obtain a fuller sound, rich in harmonics, always taking care not to reach the pontichelo sound by playing very close to the bridge. At tastiera we achieve dynamics of p, pp and ppp where little arc weight will be used, otherwise the sound will be broken. The tone and intensity of the sound can be varied with or without the vibrato and thinking about producing a deep and expressive sound is good mental preparation to achieve it. The first step to achieve a great sound is to have the intention to achieve it. Sometimes it's a matter of visualizing it.

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