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## MUSIC THERAPY INTERVENTION BASED ON THE PRAXIS AND THE PHILOSOPHY OF ELECTROACOUSTIC MUSIC. PILOT STUDY

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**Abstract:** In the present investigation, the contributions of electroacoustic music practices and philosophy to the music therapy intervention of two adults with different socio-economic situations and different levels of education were studied. Within the framework of grounded theory and phenomenological research, three concepts were developed: Sound Sensitization Exercises, Sono-fixation and Sequences of Electroacoustic Therapeutic Sounds (SSTE), which were proposed as activities in the intervention, and applied methodologically. Measurements of the hemodynamic aspect were made by means of a pulseoximeter, to obtain data.

**Keywords:** Electroacoustic music, Sound Sensitization Exercises, Sono-fixation, Sequences of Electroacoustic Therapeutic Sounds (SSTE), mental functions.

## INTRODUCTION

After venturing into the field of electroacoustic music and investigating the works of Rolando Benenzon (2000) with the Pierre Schaeffer Research group, together with the correlations between music therapy and contemporary music described by Ana Lea Maranhao (2007), the approach to investigate the applications and contributions of electroacoustic music practices and philosophy to the music therapy field arose.

With these premises, this study was carried out, with the objective of describing how the practices and philosophy of electroacoustic music can be methodologically applied to the music therapy intervention of two adult users with different levels of education. The theoretical support of entering these aspects of electroacoustic music into the field of music therapy was considered as a research problem, since there is no rich evidence in the music therapy literature within our reach, nor in related disciplines.

However, when delving into the thought of

the iconic composers of electroacoustic music, it is observed how their philosophy proposes the appreciation of each sound as a beautiful object, even all those that are perceived as noise. Likewise, he supports the idea of seeing the act of musical composition in everything that can create sounds in the environment.

Based on these reflections, the following research question was formulated: What are the contributions of the inclusion of electroacoustic music practices and philosophy, to music therapy intervention processes, within an individualized approach? Considering as the central axis of this work, that the use of electroacoustic music practices and philosophy in music therapy intervention can stimulate mental functions such as attention, memory and consciousness; facilitating creativity, imagery and relaxation states in users.

During the investigation, the phenomenon of making together with the user and according to the therapeutic objectives, compositions that involved the practices of electroacoustic music, where noise would not be discarded, but a sound object to structure in said compositions, was studied. These sound products or therapeutic compositions were named Electroacoustic Therapeutic Sound Sequences (SSTE), due to the procedure used to achieve this: users experienced the sound possibilities of a specialized recorder that magnified the elements of the sound environment and their improvisations, while recording the most significant sounds for them, throughout the intervention.

At the end of each session, the SSTE were performed, using music editing software and taking the precaution of editing the sounds according to the therapeutic objectives; Additionally, during the study, quantitative variables such as the heart rate of the users and oxygen saturation were observed; these variables were measured through the use of a

pulsoximeter.

After obtaining the results of the study, the applications of electroacoustic music to the music therapy discipline were discussed, describing them as a possible technique in music therapy that involves the approaches of receptive music therapy and improvisational music therapy; with the aim of stimulating mental functions such as; the creativity; attention, consciousness and memory together with the reach of states of relaxation.

## **THEORETICAL FRAMEWORK: PHILOSOPHY OF ELECTROACOUSTIC MUSIC**

Electroacoustic music is a genre of academic music that developed in the mid-20th century, with the research activities of composers associated with broadcast studios; mainly in Europe and the United States. Electroacoustic music was the first genre in the history of academic music, which involved the use of electronic devices in musical composition. The praxis of this music is based on the act of recording sounds from any sound source and manipulating them.

Some composers who developed a philosophy around their compositional ideas and works, and who were relevant in this study, were: Pierre Schaeffer (1988) who defines this music as that which aims to “compose works with sounds of any origin, especially those called noises, judiciously chosen and later assembled using electroacoustic mounting and mixing techniques of the recordings” (p.20). John Cage (1999) for whom the difference between sound and space did not exist, developed his philosophy from Zen Buddhism, and the sound-silence duality (p.12).

Karlheinz Stockhausen (1985), who sought to compose based on intuition and discipline, arguing that there are signs of the spirit that from the bottom of its intuitive

baggage receives impulses, incitements, ideas, messages directed to the body and reason (pp.95-104). His philosophy was: that man, animals, atoms and stars make music.

In the field of musical pedagogy, the ideas and concepts of the Canadian composer Murray Schafer (1992) were and continue to be revolutionary, he incorporated the term Soundscape into academic music: “I call Soundscape (Soundscape) the acoustic environment, and with this term I mean the total sound field, whatever the place where we are” (p.12).

Access to recording technology, the manipulation of magnetic tapes, and the use of electronic devices allowed these composers to create a new compositional language. This is how electroacoustic music admits all sounds as a possible material to structure compositions. Due to this plasticity, electroacoustic music is easily correlated to the field of music therapy, seeking to awaken in users the awareness of the sound environment, the appreciation of each sound as a beautiful object, the insight of being creative people with the ability to compose music.

## **REVIEW OF THE MUSIC THERAPY LITERATURE**

Although there are no extensive references in the literature or similar studies that correlate electroacoustic music to the music therapy field, there are some music therapy journals that include articles referring to the use of electronic devices in music therapy intervention. Similarly, the correlation of this current of thought with electroacoustic music is notable, since both axes use music technology to develop their ideas.

In the magazines: *Journal of Music Therapy*, Barbara Morgan and Ogden Lindsley (1966, pp.135-143) refer to the use of stereophonic music versus monophonic music. James Warren (1980, pp.16-25), describes the use

of synthesized sounds, rhythmic patterns and nonsense syllables, in conjunction with images, within music therapy interventions for psychotic patients. In Perspectives Robert Krout (1988, pp.114-118) introduced the use of sequencers, so that patients could experience musical composition in a natural way.

In ``*Nordic Journal of Music Therapy*`, Wendy MAGEE and Karen BURLAN (2008, pp.124-142) describe a qualitative research, within the framework of grounded theory, where the use of musical technologies such as MIDI processes and music software in the therapeutic environment is studied.

These articles have as a common element, the appreciation for the use of music technology in therapy, valuing how the user has access to a new universe of sounds, where they can interact in a musical environment, facilitating the emerging ones related to communication, expression and the construction of an identity and motivating the participant to commit to the intervention.

The most significant bibliographic reviews in the music therapy literature of the correlations between contemporary music and electroacoustics in the field of music therapy are reviewed by the Latin American music therapists Rolando Benenzon (2000) in Argentina and Ana Lea Maranhao (2007) in Brazil.

### **BENZON'S WORK WITH THE PIERRE SCHAEFFER RESEARCH GROUP**

For Benenzon(2000), electroacoustic music is a re-creation of intrauterine sounds, that is, a circular return to the beginning of evolutionary development. Based on conversations with Pierre Schaeffer's musical research group, Benenzon carried out an intervention aimed at children with Dawn Syndrome, approximately six years

old. The most significant experience with electroacoustic music was listening with the group to the symphony for a solo man, by the composer of concrete music Pierre Schaeffer, (pp. 45-49).

During the intervention, the children listened to recorded sounds such as; heartbeat of the human heart, sounds of water (washing, shower), sounds of a city (bus, sirens, traffic with horns), sounds of animals (meowing and barking), this type of sounds are characteristic of concrete music (a subgenre of electroacoustic music). In the last sessions, music by composers representative of the periods was used; early and late baroque, classical, and finally 20th century music (music concrete).

The result of this experiment was to observe how the heartbeat induced a pleasant regressive situation in people, at a higher level than the music itself. He also recounts how among the children, especially the hyperactive ones, there was a decrease in movement when listening to the recording.

From his research experiences, Benenzon (2000) makes 4 therapeutic proposals that could be research for future music therapists: The use of sounds that produce exclusive somatic sensations in hypochondriac patients. Use in certain delusional states of sounds that intercept thought. The replacement of certain hallucinogenic drugs by sounds that cause regressive and hallucinatory states. Use of sounds as an approach technique in psychotic children.

### **SOUND EVENTS IN MUSIC THERAPY BY ANA LEA MARANHÃO**

Based on the correlations between contemporary music, electroacoustic music and concrete music, Ana Lea V.Maranhao (2007) develops her concept of sound events in music therapy, describing it as forms of expression that are presented and that are

based on emotions, feelings, the emergence of representative and projective identities that demarcate a music therapy territory (p.47).

Through reviews of the thoughts of Pierre Schaeffer (sound object) (pp.28-33), François Bayle (p.55), (sound image), Murray Schafer (Soundscape), JonhCage (Indeterminism) (p.31), Ana Lea Maranhao seeks to investigate and reflect on sound production and music listening within the music therapy context.

Maranhao points out how with the thought of these composers, western music takes new directions, breaks up the tonal system, and new concepts and names of musical elements are created, e.g.: ultra chromaticism, microtones, glissandos (sound sliding from chromaticism), clusters (agglomerations of neighboring notes), random and indeterminate music. For Maranhao these expressions are used to form a new thought of sound and above all to make music.

## **DESCRIPTION OF THE INTERVENTION IMPLEMENTED IN THE RESEARCH**

The intervention proposed in this study is based on electroacoustic music techniques and involves a series of activities carried out consecutively to progressively achieve a therapeutic objective. As an introduction to each session, in the first instance, the users were invited to listen carefully to the sounds of the environment, as the central activity of the session, the participants were asked to record the sounds that were most significant to them, and finally, the researcher music therapist transformed these sounds, using various music editing software, and carefully editing the sounds, according to the therapeutic objective of each session.

During the study, these three activities became main concepts developed from the correlation between music therapy and electroacoustic music, which during the study

were sequentially named as follows:

1. Sound awareness exercise.
2. Sono-fixation exercise.
3. Sequences of electroacoustic therapeutic sounds (SSTE).

## **SOUND AWARENESS EXERCISE**

The first activity or sound awareness is based on the precepts of the composer Murray Schafer (1992) and consisted of listening carefully to the sounds of the environment. The activity is taken from one of Murray Schafer's books (1992): Towards a sound education, 100 listening exercises and sound production.

The exercise consists of giving the user a blank sheet, with a slogan written at the top of the sheet. Some of the slogans were: "This sheet is a musical instrument, you are going to explore its sound. How it sounds?". "You are going to write down all the sounds you hear on this sheet, the loud sounds will be placed at the top of the page and the soft ones at the bottom." Other exercises propose improvisation with objects from the sound environment within reach of the person, for example, give the user a sheet of paper with the slogan: "This sheet is a musical instrument, how does it sound?"

## **THERAPEUTIC OBJECTIVES OF THE SOUND AWARENESS EXERCISE**

The therapeutic objective of this practice is to create in the user a deep awareness of the sound environment, to stimulate attention, imagery and facilitate states of tranquility and joy. All the exercises involve the discrimination of sound by means of attention. Other additional objectives are: Generate empathy and facilitate verbalization in the user.

## **SONO-FIXATION EXERCISE**

The sono-fixation activity is the act of recording sounds and then listening to them. The importance of this concept taken from electroacoustic music and correlated to music therapy intervention is that it is the user who makes the recordings or sound captures by means of a specialized portable recorder, which includes implicit microphones and headphones. The activity is carried out with the user moving the recorder microphones closer to or further away from the sound object, depending on their needs.

During the intervention, listening to the sounds of the environment with the headphones of the recorder, could generate in the users, a perceptive sensation similar to that produced by a microscope with the image, when listening to the enlargement of the tiny sounds, the participants expressed their astonishment, at the same time that they received the therapeutic benefits.

Most of the recordings in the intervention were the capture of the user's improvisations, with objects from the environment or with musical instruments. This is how the user experiences his improvisation from two instances: listening to his improvisation in real time; with their ears as natural receptors, and with the recorder's headphones where the sound is modified by the device.

### **THERAPEUTIC OBJECTIVES OF THE SONO-FIXATION EXERCISE**

Stimulate mental processes such as consciousness, memory, thought, attention, facilitate a creative process in users, through learning new ways of listening. Stimulate the expression of oneself, in the process of personal identity, through the capture of significant sounds.

## **ELECTROACOUSTIC THERAPEUTIC SOUND SEQUENCES (SSTE)**

The Sequences of Electroacoustic Therapeutic Sounds (SSTE), are sounds placed simultaneously or consecutively, edited by the music therapist in his recording studio, through sound software for music editing and production. This was done carefully according to the therapeutic objectives, looking for a good sound quality and embellishing the user's improvisation through a musical production criterion. Additionally, the sound event (s.e.) was used to refer to the minimum units of sound that make up the sequence of electroacoustic therapeutic sounds.

SSTE built from the material of the user's improvisation were made, with the aim of generating feedback from the musical experience, stimulating reflection, self-assessment, and awakening creativity.

The SSTE built according to the musical history of the user facilitates the verbalization of the past events of his life, generates associations, memories and memories, reinforces sounds that identify him and that are part of his identity.

In SSTEs designed for imagery stimulation, pure electronic sounds were involved such as: high and medium frequency sine waves, white noise, and binaural waves. These pure electronic sounds were layered on sound samples. Fragments of the user's improvisation were also manipulated to which sound effects were placed, creating new sound objects. Through these sequences, imagery and visual experiences were stimulated.

### **OBJECTIVES OF THE SEQUENCE OF ELECTROACOUSTIC THERAPEUTIC SOUNDS**

Generate coherence between sessions prior to listening to the SSTE, to facilitate the communication of verbal aspects. Allow the user to provide feedback on their



improvisation, remembering the aspects that were most relevant to them. Reinforce creativity in the user. After listening to his improvisation on the SSTE, it may happen that the user wants to reorganize his composition in a similar or contrary way to the one edited by the therapist, valuing his own sound.

For the music therapist it is a session analysis tool. It allows the therapist to experience the improvisation of the user, since for the edition of the SSTE it is necessary for the therapist to listen to the recording several times, performing a deep microanalysis. Other objectives are to provide states of relaxation in the user and to give a musical gift.

## **METHODOLOGY: PARTICIPANTS**

For the selection criteria of the participants, it was decided to work with adults of any gender, between the ages of 18 and 70, preferably who did not have any type of pathology, to avoid that the proposed intervention could be counterproductive.

In order to have a neutral analytical research position and to monitor and adapt the proposed technique, two users who had a different social and academic profile were chosen; user 1 being a psychiatrist and user 2 a domestic worker. They had to have a degree of intellect and cognition that would allow them to interact with the music therapist and thus be able to make abstractions of musical sound experiences.

## **RESEARCH DESIGN**

In this work, the research design corresponded to case studies within the descriptive qualitative paradigm, in the Phenomenological and Grounded Theory research approach. This Investigation sought more to describe three activities and observe the effects on users, than to refute or prove a hypothesis.

The data collection of this study was carried

out through field diaries, verbalizations and microanalysis of videos and recordings. These data were examined through the rigorous steps recommended by the phenomenological approach, i.e. read the descriptions and extract formal declarations of each protocol.

Participants' meanings continued to be formulated, grouping common meanings from different protocols. These stages were intended to give way to the integration of the data, which supported the grounded theory of the three concepts developed in this research: sound sensitization, sono-fixation, and SSTE.

Within the quantitative paradigm, heart rate was monitored in the population by means of a pulseoximeter in order to obtain data triangulation.

## **PROCEDURE**

The procedure of this work consisted of systematically and methodologically administering to the users the three concepts developed in the study, during 20 sessions divided into 10 sessions for each user. In the first sessions, the musical history of each participant and the sounds that identified them were verbalized.

In subsequent meetings, an improvisational music therapy session alternated with a receptive music therapy session, the central activity being listening to the SSTE built from the material from the previous session. In each session an introduction was made through a sound awareness exercise, and it ended with the verbalization of the experience.

## **RESEARCH INSTRUMENTS**

The research tools and data collection methods of the study were the types of research notes proposed in the qualitative grounded theory paradigm. These observations were recorded in tables containing different responses categorized into: Emotions and feelings, body sensations, visual experiences,

memories and memories, as well as musical, verbal, cognitive and emotional aspects.

Additionally, the recording per session was used in a table of the monitored hemodynamic aspects, figure 1. Chart of the hemodynamic aspect, i.e.: heart rate (HR) and oxygen saturation (O2). In figure1. Table of the hemodynamic aspect, the HR of the user while listening to the SSTE was symbolized by the red line, which in this case is the lower line, while the O2 was represented by a blue line that corresponds to the upper line. The “y” axis symbolizes the HR and O2 from the zero point to 120. The “x” axis refers to the duration of the SSTE divided by minutes and seconds, on an interval scale that varies according to the importance of the sound events and the data obtained in the measurement with the pulseoximeter.

## **ANALYSIS OF RESULTS**

The analysis of the results of this study mostly involved the comparison of qualitative data from both users, for each of the three concepts described in the research. These data were placed chronologically in tables that described the mental functions, the affects and the hemodynamic aspect, which the three described concepts stimulated in the users.

### **ANALYSIS OF RESULTS HEMODYNAMIC ASPECT**

Figure 2 is an example that indicates the most significant quantitative data, of the hemodynamic aspect, of one of the users throughout the intervention. When comparing the data of both users, it was observed that in general, there was an increase in the heart rate of the participants, when listening to the heartbeat, binaural waves, sine waves of high frequency, and the superposition of two waves of different frequency. In the study these sounds were called sound events, which were placed in the manufacturing of the SSTE.

Based on the observations previously exposed, related to the variations of hemodynamic patterns such as HR while listening to the SSTE, we can affirm that its monitoring is a reliable tool to correlate the psycho-emotional and physical changes in response to the various sensations; perceptions, ideas, emotions, images, and thoughts that may emerge during the receptive experience of SSTE. Additionally, the use of more specialized measurements, related to neurotechnologies, in future research will provide alternative explanations regarding other physiological responses to complement the results.

### **ANALYSIS OF THE RESULTS OF THE SOUND AWARENESS EXERCISE**

When comparing the descriptions of the users in the sound sensitization exercise of the first sessions with the last ones, it was observed that at the end of the intervention the users had a deeper awareness of the sound environment, at the same time that they increased their focused attention. When analyzing the data, it was observed that when used progressively, the users stimulated mental functions such as; creativity in the act of imagining the sounds of the environment abstracted from their causal source, attention in the discrimination of sounds, awareness when listening to sounds that are usually ignored.

### **ANALYSIS OF THE RESULTS OF THE SONO-FIXATION EXERCISE**

The sono-fixation exercise was one of the central activities in the development of the sessions. Although transporting the portable digital recorder to the site where the sessions were held did not create obstacles in the study, one of the recommendations is to have a stable music therapy setting, in order to adequately monitor the electronic devices, which is essential to achieve the objectives



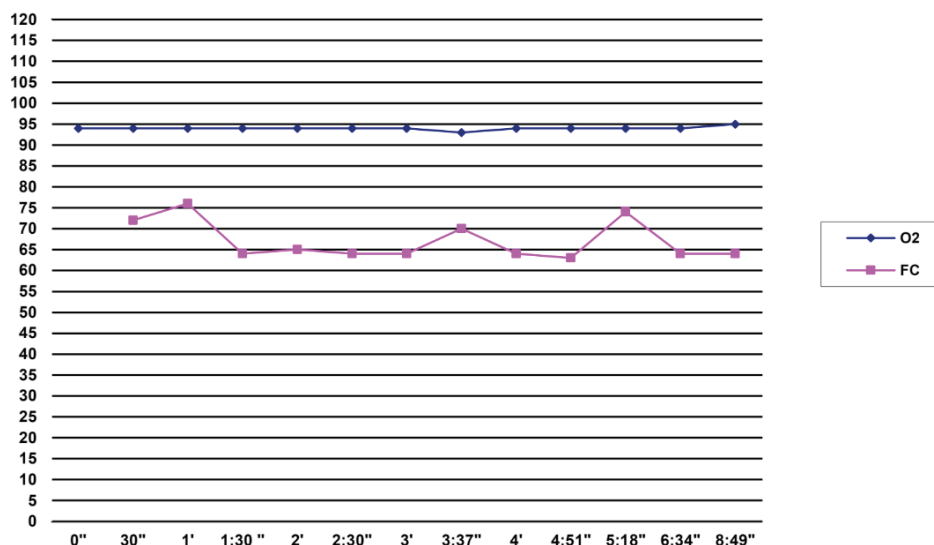


Figure 1. Chart of the hemodynamic aspect

Number of session	Sound event and analysis.	Heart Rate/HR, quantitative data in beats per minute/ Bpm
Session 3	The FC reached the highest point in listening to: Binaural sound, heartbeat, fragments of songs from musical history. The HR remained stable when listening to: sea waves, the sound of a leak, Tibetan bowls.	76 / Lpm It was the highest point. He was stable at 64/Bpm
Session 6	HR decreased when listening to 90hz sine waves.	From 83 to 69/ Lpm
Session 10	The HR reached the highest point in the listening of the binaural sounds. The lowest point in FC was reached by listening to the fragments of his improvisation organized by phrases.	68-63/Lpm respectively.

Table 1. Quantitative data of the Hemodynamic aspect of user 1

Sound events of the (SSTE)	Affections	Mental Functions
User improvisation with instruments.	Tranquility, pleasant feeling.	Memory, memories of improvisation with the piano.
Song snippets from the user's Music History.	Nostalgia, Pleasing	Memory
Mid-high frequency sine waves.	Liking	Creativity, abstract thinking. Associations to visual references of planes, trains.
Loop	Exaltation, Increase the F.C	Associations to visual referents.
Binaural sound	Acceleration of the F.C.	Creativity. Association of the sound to another onomatopoeic.
User improvisation with environment objects	Pleasant, stimulation of creativity.	Attention, Knowledge, concentration, creativity.
Sound effects to the improvisation of the user	<i>Insight:</i> The user stated that she was a creative person.	Attention, memories. Self-perception.

Table 2. Grouping of meanings in the reception of the SSTE / USER 2

set in each session. After reading the descriptions and session recording protocols, it was observed that the recorder stimulated imagery experiences, at the same time that it contributed to the process of focused attention of the users.

## **SSTE ANALYSIS**

For the analysis of the results of the SSTE, the meanings of the data obtained were grouped in tables, e.g.: Table 2., contains the description of each one of the sound events (s.s.) that made up one of the SSTE of user 2, as well as the affects that these sounds produced and the mental functions that said (s.s.) stimulated.

The SSTE built from the sounds of improvisations from previous sessions allowed user 1 to recall feelings perceived in these sessions. This facilitated the verbalization of the closure of the therapeutic process. Likewise, user 1 had the insight to want to repeat the improvisations and give his sounds a personal organization, however he expressed: "The combination is very nice, it made me feel good."

During the study, users were avoided in regressive states, so the use of pure electronic sounds was preferred and not the heartbeat, and the fragments about the songs of their musical history were carefully handled. The regressive states of the patient were not studied since it was not the objective of the investigation.

The SSTE built from user 2's improvisations stimulated her imagery and non-ordinary listening to the sound environment, facilitating verbal expression. Memories of her improvisations made it possible to establish coherence in the therapeutic process. The SSTE aroused feelings of joy, tranquility and happiness. Likewise, an emergent of the process was the Insight of being a creative person, manifested through the words: "I did

not think that those beautiful sounds would have been created by me."

## **CONCLUSIONS**

Through Grounded Theory research, it was possible to describe a music therapy intervention program based on the practices and philosophy of electroacoustic music. Consequently, from a phenomenological point of view, three concepts were developed: Sound awareness exercises, sono-fixation exercise and Sequences of Electroacoustic Therapeutic Sounds (SSTE), these activities being the first guidelines for a future music therapy technique.

These concepts were framed within the approaches of receptive music therapy and improvisational music therapy. Likewise, it was possible to design and implement a music therapy program, based on the practices and philosophy of electroacoustic music, which during 23 sessions, was methodologically and systematically administered to two adults with different socio-cultural environments.

Sound awareness exercises generated empathy in the user-therapist relationship, promoting awareness of the sound environment. In the sono-fixation exercise, it was observed that the recorder became an intermediary object, where the therapist was a facilitator of the patient's musical experience. The SSTE made from the improvisations, work to generate in the users the self-assessment, and the state of reflection, in addition to allowing a feedback of the improvisations,

In the measurement of the hemodynamic aspects of the users, when listening to the SSTE, it can be concluded that in general, an increase in heart rate occurred, when listening to sounds such as: the heartbeat, binaural waves, sine waves of high frequency, and the superposition of two waves of different frequency. Likewise, when analyzing the results obtained from the graphs that mediate

the hemodynamic aspect, the decrease in Heart Rate was observed, every time they finished listening to the SSTE, giving evidence of the achievement of relaxation states in both users.

The scarce bibliographical reference in the literature at our disposal, as well as the scarcity of more updated references, were the biggest obstacles to sustain the three concepts developed in the study.

After analyzing the results of the study, it was concluded that the concepts developed in the

intervention facilitated in the users the search for sounds for the development of an identity, the capacity for reflection, the stimulation of mental functions such as; attention, creativity, awareness, memory. In the same way, it provided positive insights in the users, together with the achievement of states of relaxation. Likewise, sound specialization and programming tools will allow the therapist to create specialized devices, providing future users with new musical experiences.

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