

## THE USE OF MUSIC IN NEUROCOGNITIVE DEVELOPMENT

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Since the essence of music is sound this program uses sound/music synonymously to support the stated learning process. We know that vibrations can be audible or inaudible and that as soon as they are organised in a specific way, they form the basis of music. This 'organisation' occurs when the basic music elements, separately and in a variety of combinations, result in music of different genres, music from different periods of history and music specific to different cultures (either contemporary or traditional).

The sonic environment plays a crucial role in the learning process. Both organised and random vibrations can, amongst other things, alter our physical state, increase or decrease our heart rate, affect the blood flow and energy levels, stir up emotions, cause restlessness, melancholy, enthusiasm or a range of other emotions. They can distract and restrict physical and mental processes, or accelerate and promote learning. They can also motivate, engage and focus the mind, help develop patterns of behaviour and assist in internalising and memorising information.

Since sound does not only enter the body through the ears but through the whole skeletal system, it can consciously or unconsciously affect us. Vibrations are sometimes felt as well as heard but irrespective of whether or not the brain consciously registers this, the body has to deal with any sound that occurs within its vibrational zone.

Increasingly we live in a sonic environment which is more complex and in which the levels of sound have increased in intensity. Many students are not learning as well as they should because educators often lack an in-depth understanding of the effect of sound on learning. We know that autistic students cannot cope with high levels or complexities of sound but it is difficult to ascertain to what extent sound will influence any individual. It is, therefore, safer and more sensible to **control** the sound environment than to leave matters to chance.

The power of sound/music in the strengthening of neural pathways lies largely in the existence of a time frame in music. Since sound /music has a definite beginning and a definite end, the brain can be trained to focus specifically within this designated time frame.

This clearly differs from visual or tactile stimuli which can be used intermittently and which allows the brain to digress and return at will. Engaging in focussed listening activities which increase in length and difficulty and rely on concentration for the duration of the sound stimulus, increases the brain's capacity and complexity.

We need to develop sound sensitivity – and, thereby, learn discernment. (There are no hard and fast rules since there will always be variables in terms of the tolerance and adaptability of individuals but we cannot afford to allow students to proceed through life without an understanding of how sound/music can affect them. A child should not battle through an haphazard sonic environment where some individuals cope whilst others do not).

Sound sensitivity develops as a result of focussed listening and analysis of sounds. This

sound sensitivity and discernment will allow both facilitators and students to make good choices and allow sound to be used to promote rather than hinder learning.

## MUSIC CONCEPTS

The basic concepts which organise sound into music are:

- pulse (the basic beat of music);
- rhythm (the sub-divisions of pulse);
- tempo (the speed);
- dynamics (intensity or volume);
- pitch (the levels of sound);
- harmony (the combinations of pitch levels);
- timbre (the quality of sounds);
- form (the organisation of musical compositions).

Learning to recognise and identify the various elements and concepts of music, separately and in various combinations, teaches students to listen intently and to analyse more closely what they hear, to associate sounds with other sounds and to transfer information from one context to another.

Students generally perceive engaging with sounds and music as 'fun' and as being less threatening than using written factual information. So, for example, a language exercise using a song can often encourage a reluctant learner more than a traditional written exercise might. Although language uses its own elements to convey facts and emotions, the ability to interact with language depends on the degree to which an individual is able to decode the messages.

Since music can elicit an immediate emotional response there is an ability to receive messages and information through music which transcends the need to employ complicated decoding systems. Using music, students learn to receive and interpret information in a way that allows them to perceive subtle nuances and innuendos. This response is often sub-conscious and causes a reaction regardless of any ability to understand or analyse music. This does not occur as powerfully with written or spoken language. Unless the language is understood at a deeper level, the recipient will not react to the nuances and subtleties at all, whereas there is universality in the reaction to certain musical qualities which transcends conscious understanding or analysis.

This immediate response to music is determined by the combinations of elements and concepts. For example, if the music is overtly and strongly rhythmical, the body immediately reacts physically to the pulse and rhythm and there is a natural and spontaneous tendency to want to move. Here music can play a vital role since the rhythm and pulse of the music can engage the brain which 'hooks' into these elements. This can be especially so if the pulse is similar to the heartbeat of the listener.

Equally, strong melodies and certain combinations of chord structures can elicit a spontaneous emotional response. Tempo variations also modify responses as do dynamic levels. Music can appeal to past and present memories and emotions and allow for connections and transfer to occur more easily.

As previously stated, one of the strongest reasons for using sound and music is that they

both occur within a time frame. It is this time frame which needs to be fully exploited since herein lies the potential for engaging the mind, retaining concentration and strengthening neural pathways.

Since music avoids the requirements of language for detailed de-coding it can be very powerful in promoting successful learning. Unfortunately music has often been marginalised in formal schooling, remaining on the periphery of what is perceived to be 'real' learning. Thus, the use of music remains under-utilised and un-explored.

## ACTIVITIES

The activities used in this program adhere to the learning process as it is described in the article, 'The Learning Process', available on the auditory enrichment program home page.

In an auditory programme, receiving information obviously constitutes the **HEAR** activities. The use of the human voice has limitations as familiarity allows the brain to disengage and 'switch off' so that not all the details of the information or message are received. Consequently a reliance on the human voice in the learning process often requires the continual repeating of instructions to those students who failed to engage their minds from the outset.

Conversely, the use of sound/music can teach students to listen and not simply hear; to perceive and not just to receive information. This is because it provides a greater range of sonic input and it occurs within a controlled time frame. For example, the pulse and rhythm of music can immediately capture and engage both the mind and the physical body whilst the time frame of the music forces the brain to focus for the designated time period.

For this to be a truly successful means of promoting learning, the activities need to be carefully and intentionally constructed. Some music education programs are not as successful as they could be, either in promoting music learning or learning through music, because they lack specific intentions beyond a measurable or observable outcome (like accumulating knowledge, developing skills and acquiring attitudes or 'having fun') to clear, specific cognitive outcomes. We might learn about Mozart and how to analyse his music and appreciate it but we often fail to address the cognitive processes that have contributed to this learning process.

As in any learning situation, the facilitator plays a major role in determining the outcome. This program is designed to support facilitators in this regard.

Processing and interpreting information, making connections, comparing and contrasting is part of the **EXPERIENCE** stage. As the word 'experience' suggests, the learner engages actively with the information. For this stage to be successful, once again, there needs to be deliberate and intentional action. Listening must be active. Students must know what elements they are listening to, how they should listen and the reason for their listening. It is insufficient to simply ask students to listen, for example, to the orchestra without telling them how to listen and what purpose such concentrated listening plays in their learning process.

It is a fairly logical and simple process. What is the activity? How is it to be executed? Why are we doing it? It is this 'why' element that is often missing in the learning process and

which results in students seeing no purpose for an activity. The 'why' element needs to extend beyond the gaining of information, and the developing of skills and attitudes to matters related to the functioning of the brain.

In order to develop metacognition students must become aware of the mental processes in which they engage and the reason for doing so. Throughout this program, students are increasingly made aware of what the activity entails but also what mental strategies are needed for success. It is this process which develops personal involvement and responsibility for learning.

This program assists them to become increasingly aware of why it is they succeed or not and how this is linked to their ability to focus their mind, to listen intently, and to concentrate. Any of these processes can be impeded by any form of distracting vibration such as extraneous sounds and movements.

The **STRUCTURE** stage is really integral to all stages but can be considered separately for convenience sake. Within this programme it allows for a specific focus to be placed on internalising information which has been 'experienced' and which, once understood, can be committed to a memory bank in a more structured way. The structure of the information in the memory bank allows for stronger neuro-cognitive links to occur and thus greater fluency in recalling information. This is a consolidation stage during which information can be more clearly transferred into other appropriate contexts.

The **RE-CREATE** or **ARTICULATE** stage is the 'output' and is as important as the 'input'. Students are often unable to communicate what they have learned in any way – visually, verbally or in any other audible way. The learning cycle is only complete if the learner can communicate what has been learned in an appropriate way. This stage allows the student to demonstrate this ability and in so doing successfully completes the learning cycle.

In an auditory program such as this one, this process constitutes the ability to re-create or re-organise sounds audibly in a performance/demonstration, orally through explanation and description, visually in a suitable traditional or graphic way or kinaesthetically through dance, movement, acting and mime.

The combination of these four stages ensures that effective teaching and learning occurs. It is important to remember that the stages are not necessarily always presented in the same order and sometimes two or more stages can be combined. The students should be involved in all four stages to ensure that the learning cycle is complete.

A close examination of the structure of this auditory enrichment program will reveal that it explores the use of sound/music in learning to its fullest potential.