Reflections on musical intelligence

Reflexiones sobre la inteligencia musical

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Abstract

This article analyses the characteristics of musical intelligence within the framework of the multiple intelligences model with the aim of moving forward the relationship between development, learning, and the optimisation of these intelligences. The skills and capacities that are developed in interaction with musical intelligence are analysed as are the main lines of teaching work in schools, especially in the case of people with a specific educational need. Similarly, a brief overview of the proven effects of musical practice and the development of musical intelligence is provided, identifying some of the cortical and subcortical areas involved in these intelligences and the modifications that musical training generates, with some suggested criteria about its pedagogical uses.

Keywords: Multiple intelligences, musical intelligence, education, development, educational needs.

Resumen

En el marco del modelo de las inteligencias múltiples, se analizan las características de la inteligencia musical, con el objetivo de avanzar en la relación entre el desarrollo, el aprendizaje y la optimización de estas inteligencias. Se analizan las habilidades y capacidades que se desarrollan en interacción con la inteligencia musical y las principales líneas de trabajo docente en la escuela, especialmente en el caso de personas con alguna necesidad educativa específica. De igual forma haremos un breve recorrido por los efectos contrastados a que da lugar la práctica musical y el desarrollo de la inteligencia musical, identificando algunas áreas corticales y subcorticales implicadas en esta inteligencias y las modificaciones que genera el entrenamiento musical, sugiriendo algunos criterios sobre los usos pedagógicos.

Descriptores: Inteligencias múltiples, inteligencia musical, educación, desarrollo, necesidades educativas.

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Within the academic community and in educational fields, the concept of multiple intelligences has been known about for a long time. This concept was proposed and developed by Howard Gardner, and although initially it was simply a theoretical concept, studies currently show this theory's possible applications to education. This article refers to multiple intelligences in general, but focusses specially on musical intelligence and on the importance of developing this at an educational level. At the current time when it seems like the arts are vanishing from curricula and from the educational system, it is necessary to underline the importance of music and the arts in general in the cognitive and emotional development of our children and adolescents.

1. Multiple intelligences

The multiple intelligences theory, developed by Howard Gardner in 1983, is a very interesting idea about how we can change our understanding of intelligence and above all of human beings' capacity to learn. From the educational perspective, the recognition that people do not all learn the same way, or learn the same things at the same pace has been particularly important. Accordingly, Gardner (2011b) asks why we continue teaching and evaluating everyone in the same way when we understand that everyone learns differently. Gardner (1994) considers that the field of human cognition should embrace a more universal range of talents, accepting that human beings have evolved to display different intelligences and not to rely in different ways on a single flexible intelligence. This concept leads to the suggestion that multiple intelligences exist instead of the old idea that all human beings share a single type of intelligence. Gardner (2011a) initially proposed seven different types of intelligence, as shown in Table 1; however, in the subsequent expansion of his work, he added naturalist intelligence, although there is also the possibility of contemplating other types of intelligence such as existential or pedagogical intelligence.

TABLE 1. Types of intelligence.

Frequency
88
60
28
13
1
190

Source: Gardner, 1998.

Taking this concept of intelligence as a starting point, it is apparent that there are different forms in which each person can better perceive, understand, and interpret the information that provides them with the socio-cultural spaces in which they develop. For example, people with a greater capacity for bodily-kinaesthetic intelligence learn and perceive information better through their body and its movement, and make connections between information through the body and its movements. These people are much more adept at sports and dance than, for example, people with greater logi-

cal-mathematical intelligence. This does not mean that each person can only have one type of intelligence or is unable to develop a given type, but this will largely depend on the type of education they receive and on the setting in which they develop. The most interesting thing about this concept is understanding that no given intelligence is more important than any other and that all people can develop the different intelligences in one way or another if they are appropriately cultivated (Gardner, 2011a). In Gardner's words, each of these intelligences is «a biopsychological potential to process information that can be activated in a cultural setting to solve problems or create products that are of value in a culture» (Gardner, 1999, p. 45).

In the years since the publication of his theory of Multiple Intelligences, Gardner has expanded his work in this area to include the concept that could be called «multiple minds». This is a very interesting concept to develop and use in the different teaching practices of the school. Gardner (2008) notes the importance of educating children and young people in the development of five different types of minds as a way of reinforcing the multiple intelligences, thus raising the really important challenges of current education. He mentions three types of cognitive minds and two emotional types of mind (2008). From the cognitive perspective, he describes the creative mind, the disciplinary mind, and the synthesising mind, and from an emotional or possibly human perspective, as Gardner calls it, there are the ethical mind and the respectful mind. The disciplinary mind refers to the tendency of humans, and in particular schools, to turn people into specialists in a single area or topic, such as playing an instrument. Learning to play an instrument correctly requires years of practice, dedication, and study to acquire this specialisation; therefore, high levels of discipline are required. There is also the synthesising mind, which is the one involved, for example, when solving a specific task, and can take a broad range of resources and use only that information that it identifies as important and useful for solving the task in question. In the current digital era and with all the information available, processes of specialisation are becoming shorter and a rapid evaluation of all available information —or much of it— is becoming very necessary with the aim of using only the information that is genuinely relevant to synthesise it and use it appropriately. Finally, from the cognitive perspective the creative mind is described; this might not be present in all people but schools should foster it. Gardner (2008) suggests boosting it by providing challenges and obstacles to learners in different subjects so that they can develop new ways of understanding and learning. This obviously does not involve encouraging competition between students; rather, the idea is that teachers are also creative when coming up with the topics and the way of working in the school. The aim is that students, by using the different minds and intelligences, develop an approach to knowledge that motivates and interests them and so they acquire meaningful learning. From the more emotional perspective, Gardner describes ethical and respectful minds which are closely linked to moral develop-

ment. Developing these minds is related to education in values and education for citizenship, considering these areas as vital for the development and well-rounded education of a human being, beyond the basic subjects on the curriculum.

Given that the different intelligences can be cultivated and developed, Gardner, like Montessori, believes that teachers must prepare the learning environment so that it favours active and constructive learning (Ferrándiz *et al.*, 2006). This model makes it possible to value critical thinking by children when they face tasks that are very different than the ones they are used to doing. The main objective is not to evaluate how much knowledge they possess, but rather their skills, attitudes, and working habits relating to the different curriculum or learning areas. However, in schools, the differences between the intelligences are still ignored, or in simple terms only one or two of them is encouraged: linguistic and logical-mathematical, with the development of the other intelligences being neglected, and the five minds mentioned above not being considered. The problem of ignoring the differences between types of intelligence in students affects all of the educational community: schools, families, teaching staff, students, and their sociocultural setting. The different learning styles and the various intelligences are not regarded as being of equal importance (Bedoya & Amaris, 2007), resulting in the loss of talents and skills in the youth population.

At present one of the areas that is most neglected in schools and in the curriculum in Spain is the arts. Since the most recent legislative update —the Law for Improving Educational Quality (LOMCE, 2013)— arts and music are no longer compulsory subjects and how they are delivered and the amount of time dedicated to them have become the competence of each autonomous region, meaning that there is less and less space in the curriculum and in the class hours per week for the arts.

We will now see why it is a priority to give the arts the prominence they deserve, especially music, if we want to improve our educational system and promote the development of our students.

2. Musical intelligence

Musical intelligence and the development of the so-called «musical brain» are fundamental topics in child development. A definition of musical intelligence will first be provided, then its implications for the pedagogic and emotional development of people undergoing education will be described, and finally the implications at a pedagogical level will be discussed.

Musical intelligence comprises an individual's sensitivity to melody, harmony, rhythm, timbre, and musical structure (Gardner, 1998). This skill is not just expressed in the composition and performance of pieces with pitch, rhythm, and timbre, but also in listening to and discerning them. It can be related to other intelligences, such as linguistic, spatial, and bodily-kinaesthetic (Gardner, 1998). According to recent studies (Levitin, 2014), we know that the human brain is capable of learning and deriving the rules and structure of any type of music with which it comes into to contact at an early age, in a similar way to how it does

with languages. This does not mean that it cannot be learnt throughout the individual's life, but as with second-language learning, exposure and early contact with the different structures produces significantly better results. According to Levitin (2008, 2014), the neuronal developments of the human brain shows the cognitive capacity that characterises musical intelligence:

— The cognitive capacities of theory of mind, representation and reorganisation that we have as human beings are what allows the development of musical intelligence.

— The aim of art is to represent human experience selectively, emphasising the most striking elements of it or the sensations it produces.

— Having a creative brain indicates cognitive and emotional flexibility.

Gardner also states (1994) that the three skills relating to musical intelligence —perception, execution, and production— are skills that are developed from very early ages, before receiving any type of instruction or training in the topic, but consistency is required in the influence of music from the socio-cultural area to ensure better future development.

Creating art is a specifically human skill, both in its production and in the importance given to it in the development as a person (Levitin, 2008). In this sense, music, as well as setting us apart as humans, in our ability to produce, appreciate, and enjoy it, enables us to gain access to teaching and learning different key skills for relating with our surroundings, such as empathy and social relations, as well as helping regulate different emotional states. Consequently, playing an instrument or singing can modulate levels of production of dopamine (Levitin, 2008), a neurotransmitter that helps to lift the mood and stimulates the immune system. This is very important when working in the classroom with children and adolescents as it can help regulate their emotional states, thus improving interpersonal relationships among the student body and between students and teachers. The development or stimulation of musical intelligence can be a way of helping to improve this and other aspects that interfere in the everyday process of teaching practice. Furthermore, rhythmic, patterned music has a greater mnemonic effect for codifying knowledge, the vital shared information that all members of society should know. It has also been shown that singing in a group releases oxytocin, a neurochemical substance that helps to create links of trust with other people (McNeill, 1995).

Studies also show that each part of the brain has specific functions that enable the development of musical intelligence. Without going into too much detail, we can note that the motor cortex controls the tactile feedback required for playing an instrument or for dancing, the auditory cortex makes it possible to perceive and analyse tones, the hippocampus is involved in remembering music and its experiences and contexts, the visual cortex is involved in the processes of observing dance and reading music, while the cerebellum integrates all of the movements and emotional reactions associated with playing, listening to, or dancing to mu-

sic. This shows how different parts of the brain are involved in musical processes and even how the two hemispheres interact, leading some authors such as Lacarcér (2003) to state that musical intelligence uses all of the brain, given that the interaction between the two hemispheres is necessary for performing a piece of music, using the voice in a piece of music, and for musical expression and performance. All of this leads to harmonious learning and development.

3. Pedagogic implications

After reviewing the importance of multiple intelligences, and musical intelligence in particular, it is interesting to see how this model can and should be applied in the field of education and its possible benefits for students. Accordingly, it is important to set out what we are doing and we will refer to musical intelligence in school settings, but not relating directly to music teaching. In other words, musical intelligence involves a series of skills and capacities that involve different parts of the brain that are related to other skills, capacities, and learning by human beings beyond learning to play an instrument, dance, or sing. Participating in musical activities can help children improve their skills in different learning areas such as reasoning and problem solving, lateral thinking, memory, social skills, and team work (Hobson, 2009). Similarly, it is not our aim to discuss people with extraordinary talents, or with intelligence quotients above the average; in fact, our aim is to provide tools, models, and guidelines for developing and boosting this intelligence in all students.

Accordingly, we note that Gardner (1998) suggests speaking of learning centres as a way of evaluating and developing cognitive competences. These spaces are set up within the classroom to ensure that all children have the same opportunities and explore the available materials in the eight types of intelligence. In a learning centre, topics are presented according to the interests and capacity of each group. This requires teaching that is both comprehensive and individual. Learning centres are created as spaces based around each of the intelligences, so that the children work and learn with the materials appropriate to each intelligence. The objective of learning centres for musical intelligence is to value the children's capacity to maintain intonation, rhythm, and a continuous tempo within a particular melody, developing the skills of sensitivity to tone, rhythm and musical capacity (Ferrándiz *et al.*, 2006).

Despite its independence, musical intelligence has a close relationship with interpersonal intelligence. Regarding the former, one of the most interesting implications relates to bilingualism. It is known that numerous authors maintain that language and music are two capacities with similar origins (Brow, 2001, Mithen, 2005, & Patel, 2003), with melody and speech as their connecting point, linked through intonation (Fonseca-Mora, Toscano-Fuentes, & Wermke, 2011). The areas where they show important similarities include:

— Their status as capacities that are universal and are specific to the human being.

— Both allow three forms of expression: oral, written, and gestural.

— They are learnt in childhood without specific instruction.

— They make it possible to create an unlimited number of new sequences with musical elements or words.

— They have a structure with a fixed order and grammatical rules.

— In both dimensions, the receptive capacity is followed by the productive capacity.

From this perspective, it is clear that there are major similarities between language learning and learning music. Some authors claim that structured musical training helps develop phonemic awareness and auditory and rhythmic discrimination (Toscano-Fuentes & Fonseca, 2012), facilitating children's reading ability. The use of music in language teaching boosts the development of reading, writing, listening and speaking skills (Toscano-Fuentes & Fonseca, 2012). Being able to apply the pedagogical possibilities of music education helps with balanced and comprehensive training (Leganés, 2012), as well as being a very useful medium for developing children's linguistic capacity, both in comprehension and expression. In turn, the use of music in language teaching helps the development of reading, writing, listening, and speaking skills in second languages.

4. Inclusion and music

The act of discussing multiple intelligences, as Gardner notes throughout his work, means accepting that each person has a different way of learning about the world, understanding it, and representing it to themselves. Therefore, whenever planning learning activities, it is always advisable to take these possibilities into account. However, it is also true that some people who show particular difficulties when faced with learning and school, either on an occasional or permanent basis, and it is here that we believe that the development of musical intelligence might be of great use in schools and for teaching staff.

One constant concern in schools is what we can do to make them more inclusive, especially for people with special educational needs (SEN). It is important note that this refers not only to people with a diagnosed disability or condition, but that we must also include people who for different reasons require more or less intermittent extra support in their learning process. For example, a person of migrant origin who still does not know the language of the host country.

Since the 1990s, various types of study have been performed that note the influence of music on psychological and biological areas, especially in people with language difficulties (Leganés, 2012). Processing of language and of instrumental music are superimposed in the brain, suggesting that music education might help children with learning disorders like those affecting reading (dyslexia), and children with serious developmental disorders, such as those with autism, given that musical activity activates different circuits and specific special connections in the brain (Schlaug, Altenmueller, & Thaut, 2010). Similarly, it has been found that musical training improves sound processing for language and emotions (Kraus, 2010). Therefore, we can use music as a way of capturing the

interest of motivating participation by children with special educational needs who, as a result of the condition, are often isolated and do not participate actively in the different classes. Evidently this situation requires a much greater commitment than usual from teachers, as what is sought is the ability to adapt the normal materials and methodology to the use of music in the different subjects.

Part of the evidence for how music can help to improve the inclusion and development of people can be found in cerebral modifications. For example, the cerebral cortex has a clear ability to reorganise itself in line with its own needs, something which involves significant modifications. In the case of music, anatomical differences have been encountered in musicians who have developed skills such as absolute pitch (Soria-Urios, Duque, & García-Moreno, 2011). Another example can be found in blind people who have developed auditory skills, leading to a greater size of the auditory space in their cerebral cortex as they use visual areas for locating sounds (Soria-Urios, Duque, & García-Moreno, 2011). Other studies note that learning and acquiring a new skill produces changes in the cortical representation, such as for example, reorganisations of the motor cortex when learning to play an instrument (Soria-Urios, Duque, & García-Moreno, 2011). On these lines, it is worth mentioning a longitudinal study by Shlaug (2005) which found that children aged between 5 and 7 who started playing an instrument had better performance in fine motor skill and auditory discrimination tasks fourteen months after starting their musical training.

As stated above, processing music involves various cognitive functions and is linked to improving attention, emotion, cognition, behaviour, communication, and perception (Soria-Urios, Duque, & García-Moreno, 2011).

5. Interpersonal intelligence and music

Finally, we would like to underline the importance of focussing less on subjects and returning to a more wide-reaching sense of education. As Giroux (2001) notes, education is, above all, a process of socialisation. A process in which we learn to be citizens, relating to our surroundings in different sociocultural, political, and economic spaces. In all of this process, interpersonal and emotional development is vital but is often relegated to the background, as knowledge linked to the subjects on the curriculum that focus more on knowledge and less on skills is favoured. Musical intelligence involves emotional development that promotes empathy and expressing feelings, a process that involves knowledge and improvement of language and its expression, including sociocultural identity aspects (Rodríguez, Ezquerro, Llamas, & López, 2016). In addition, we should consider that when music is performed in a group, especially when improvised, it requires a high level of understanding of the other, empathy, and verbal and non-verbal expression (Davis, 1990).

Toscano-Fuentes and Fonseca (2012), in a study performed at the University of Salamanca, found that working in classrooms with music created a change in

behaviour among students and towards the teaching staff. Including music relaxes students, improves the classroom atmosphere, facilitates communication, provides greater social cohesion, and benefits inclusion in class. According to the information set out, we believe that the development of musical intelligence, above all the use of music and the other arts, in class in the different subjects is an interesting source of emotional and personal development for our students. This directly and indirectly involves work on self-esteem as the possibility of recognising the self and the other and working on empathy allows children and adolescents alike to evaluate and improve their levels of self-esteem. Furthermore, when boosting their different capacities and taking into account their different ways of learning through multiple intelligences, we avoid stigmatising and isolating them or separating them from the educational system and so from society.

6. Conclusions

The concept of multiple intelligences is key to contemporary education, as we cannot continue educating the children of this century using techniques from the nineteenth-century. And yet it seems that this is what we do when we treat their intelligences and consequently their ways of learning as the same. If we consider that every person understands, interprets, and relates with the world and their surroundings in different ways, we should clearly understand that they learn in different ways. The theory of multiple intelligences seeks to help us guide these new pedagogies aimed at meeting the needs of a diverse population that might include people with special educational needs and definitively takes into account all of our educational population. In this vein, this theory states that no particular type of intelligence is better or worse than any other, but that they are all interrelated and can be strengthened through practice.

From this perspective, we should return to Gardner's idea of multiple minds, noting that not only do we have multiple intelligences, but that we have five types of mind that can help us to develop better each one of the intelligences. Of the minds he describes, we particularly concentrate the respectful and ethical minds as these are the ones that have the emotional and human component that is so important for children's development and which is connected to the development of musical intelligence in particular. As we have seen, musical intelligence is a very important source of emotional, social, and communicative development, for all types of student. Studies have noted the improvement in relationships and empathy in the cases in which it has been worked on in the school with and through music.

In addition, it is important to recall that musical training has very significant effects at a cerebral level. As has been shown, the musical mind is developed in different cognitive functions and different parts of the brain, and as more training is received, it is apparent how this causes physiological changes to adapt to the new needs, something that is highly desirable and important in the case of people with some type of special educational need, for example, a disability.

In this article, we have tried to make it clear that we are not just referring to the importance of music teaching and arts in themselves within the school, but to the use and development of musical intelligence in all areas of education, looking to strengthen different skills, including cognitive, emotional and social.

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