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Music: For a Sustainable Community and the Promotion of Well-being

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Abstract

This contribution aims to offer food for thought on the ancestral role of music for mankind, considering its potential, transversal to different areas of interest, including psycho-pedagogical, clinical and didactic, as a heterogeneous expression of cultures, communities and characters. In spite of the fact that music education is compulsory in secondary schools, not in all contexts the activities are structured and carried out taking into account the positive implications on pupils' psycho-physical well-being, rehabilitative potential and increased motivation to learn. Just as the possibilities for dynamics and time in music are manifold, so too is the horizon of options that looms over the sky of educational action, intersecting also with the world of technology, which puts innovative tools such as serious games at the service of education.

Keywords: gamification; inclusion; music and learning; serious game; well-being.

1. Introduction

Since ancient times, music has played a significant role in the life of man, sometimes assuming a cathartic and thaumaturgical value, others a more deceptive and feral one. It is equally true that in the Greece of Socrates and Plato the dialogue on music has become denser and more articulated and we recognize precisely in the works of the latter the formative value of music in the education of young people, a value that goes beyond mere aesthetics and transcends ethics, which orients to the καλὸς καὶ ἀγαθός.

The art of the Muses dear to poets and cicadas (Plato, *Phaedrus*, 259) is understood as an art capable of promoting education, culture, training

and that favors the composition of the καλόι λόγοι, in a context of harmony of thought and form; in fact, often a speech was considered well orchestrated in the presence of rhythm, agreement between the parties, dynamics and blooms.

At a time when knowledge is entrusted to oral tradition and music becomes the depository of memory, the music-word-memory synod appears very evident: the same aedi, artisans of the word, accompanied the verses with the sound of the zither, which marked the prosody of poetic texts and it was the task of the singer to remember the founding works of a civilization, covering not only an amateur role, but also a political and social one. The story was always supported and punctuated by chords and melodies, evoking the past, emotionally involving the listener, an involvement linked to the sense of identity and community. Quoting a thought of the master Ezio Bosso "Music, like life, can only be done in one way: together", it is appropriate to underline how one of the main functions of music is collective and communitarian: that of bringing individuals together by establishing a bond between them.

If to live music as a social activity we used ἀγορά (from ἀγείρω = gathering, gathering) or θέατρον (from θεάομαι = I observe, I look), today this is no longer configured in the same way and the mass media, as well as social media, in the illusory perception of sharing, actually trap us in a substitute for the community, which is the network and the ever-increasing individualism is fluidly alienating us from a social fabric, (unconsciously) hungry for sociality.

2. A question of rhythm

Anthony Storr, in his book *Music and the mind* emphasizes precisely the community value of music and how among the participants in the same musical event a sort of "neurogamy" is established and this link is sanctioned precisely by the rhythm, which makes listening an active and motor process and produces in the participants a sense of collectivity and shared emotionality, it creates a sense of belonging, induces prosocial behavior, and strengthens cohesion. Ensemble music is born precisely from the need to participate in the community.

In addition, recent research shows that the text is remembered more easily and for a long time, if accompanied by music, this is because the brain areas responsible for music are adjacent and different from those of language, but the modular paths follow similar and partly communicating

ways and the right temporal upper lobe, implicated in memory, operates an important music-language association.

Therefore, what was automatically implemented and *sine studio*, today finds a scientific and empirical explanation, teaching children nursery rhymes set in a defined rhythm or administering songs considered pleasant by them, in order to favor the memorization and internalization of new words. And if these activities are carried out in groups, with others, the development of social skills will also be positively invested. The usefulness of music in storing large amounts of information and in being able to draw memories from our brain (es. singing the nursery rhyme of the months to remind us how many days one of them is composed of), especially in oral cultures, has certainly favored the flowering of the musical abilities of our species, as well as the only species able to replicate, reproduce and imagine the rhythm (the monkeys, from which we descend, are not in possession of such abilities) and this is reflected in the brain, observable through neuroimaging techniques and concerns the activation of subcortical areas in the basal ganglia and cerebellum, in addition to the activation of the motor cortex and subcortical systems. This "simulation of action for auditory prediction" (ASAP) would be based on the connections that the dorsal auditory pathway possesses with the regions of motor planning through the parietal cortex. Patel and Iversen (2014) hypothesize that these connections are stronger in the human species than in the other primates due to the evolution of the phono articulatory capacity, strictly based on rhythm and this could explain the ability of tapping, which characterizes man. On the other hand, the practice of putting words into music has played an important role in the lyrical, liturgical and narrative tradition, just think of the Iliad and the Odyssey, for centuries recited and handed down orally thanks to the rhythm marked by the zither and the metric of the verses.

In fact, the correlation between rhyme and rhythm not only unites language and music but is also sanctioned by a common Greek root -ρυ which indicates precisely the *flow*, the movement, the articulated flow of a melody, of a prosody.

According to Piaget's theories of emotional learning. Vygotsky, Bruner and Bloom, affectivity proceeds in parallel with the development of cognitive functions, affects learning processes and, experiences without emotional appeal will be perceived as less engaging and motivating, will not promote curiosity, which is the driving force of learning and this will be less significant. In addition, the strength of memories is closely linked to the degree of emotional involvement that characterizes them: it is more likely that a very sad / very happy event will be remembered, this is because an important involvement of the brain structures that are part of the limbic

system, such as the amygdala and the orbito-frontal cortex, has been highlighted.

That music was a vehicle of emotions, an expression of feelings and movements of the soul is a widespread and shared opinion (Strollo, 2011), but that it could even be preparatory to the improvement of skills apparently distant from it, is a recent theory and for which only in recent years research and resources are being employed. And this new approach, more scientific and empirical, is well intertwined with a type of relational and laboratory teaching, in which learning is transversal, multimodal and emotional.

Since ancient times the word-music relationship has always been problematic, and language was a musical instrument of ideas. The poet, the speaker and the philosopher composed and played grammatically. Music, as *ars combinatoria*, allows the production of a great cosmic network of equivalences and correspondences and manages to convey the truth beyond the logic of linguistic experience, in its essence of meta-knowledge, because it creates a gap of spontaneous communication between sensitivity and reason (Brancacci, 2019).

The question has often been asked: was music or the word born first?

Darwin leaned towards giving primacy to music (singing), Spencer to speech, Mithen, more democratically believed that they had developed simultaneously.

Patel, in a 2006 article, did not believe that music was a side product of the word, but that it had followed an independent development process and demonstrated this by analyzing a common aspect, both to music and to speech: rhythm.

The rhythmic pulsation of music is regular, and this regularity of perception and synchronization are not shared by the linguistic rhythm, which is an artifice of words, accented irregularly and subject to the socio-cultural context. Therefore, it is much more likely that music, more *natural*, has used a fast track.

It is believed that *Homo neanderthalensis* sang before it even spoke and created wind instruments with the bones of animals, such as the famous flute found in Divje Babe, Slovenia.; it was unable to speak due to the baseness of the larynx (as in newborns).

According to the protolinguistic theory of Steven Mithen (2005), hominids communicated holistically, modulating tone, duration and prosody of certain sounds, and musical phrases differed in height and rhythm. From an evolutionary point of view, therefore, the ability to sing precedes the ability to speak, so our brain is shaped on this expressive ability; in fact, in patients with Broca's aphasia (they cannot articulate a

period fluently), as well as people with stuttering or other disorders in the articulation of language, they are still able to sing or show less difficulty in this activity (Merrett *et al.*, 2019). This is due to precise reasons related to the neural circuit underlying the language, which differs in part from the one dedicated to the control of singing, set in a very complex way.

3. Music, as a tool of fragility

During the last decade, there has been a growing interest and progress in the adoption of music as a therapeutic tool in neurological rehabilitation and many new music-based methods have been developed to improve motor, cognitive, linguistic, emotional and social deficits in people suffering from a debilitating neurological disease, ranging from childhood-adolescence as in cases of autism (Geretsegger *et al.*, 2014) and dyslexia (Flaugnacco *et al.*, 2015), up to adulthood with cases of stroke patients (Bradt & Dileo, 2010; Rodríguez-Fornells *et al.*, 2012; Altenmüller & Schlaug, 2015; Särkämö *et al.*, 2016), Parkinson's disease (Nombela *et al.*, 2013; Bloem *et al.*, 2015) and dementia (Baird & Samson, 2015). In healthy patients, listening to music improves neuronal connectivity, while musical activities, such as learning to play an instrument, promote brain plasticity and induce changes in gray and white matter in different brain areas and especially in frontotemporal ones.

Numerous studies support and demonstrate this thesis, according to which neuroplastic modifications due to musical practice can occur, especially if the onset of musical studies was early (Nakada *et al.*, 1998; Gaser & Schlaug, 2003; Musacchia *et al.*, 2007; Yang, 2015).

Recent studies have shown that hearing is the first of the five senses to develop during gestation; in fact, the fetus is able to perceive noises and sounds through the amniotic fluid (e.g. heart rate) and here we can see a primitive form of communication, which should be processed and developed from the first years of life, educating the ear to listen and, subsequently to musical practice, fundamental in cognitive, motor, but also affective development, for reasons that will be addressed below and in which we see the close correlation between music and psycho-physical well-being.

The pedagogist Rosa Agazzi has often reiterated the importance of singing and voice education in motor and language development, confirmed by the studies of T.R. Miles, improving reading skills in children suffering from dyslexia, according to which the positive outcomes achieved are directly proportional to the precocity of musical training.

In addition, it raises the level of people's emotional life (Sloboda, 1988) and promotes the integration of all personality components (perceptual-motor, cognitive and affective-social) contributing to the psycho-physical well-being of all students; music also favors the acquisition of rhythm and grace in movements, both in body and soul in order to obtain a beautiful, strong and well-shaped body that becomes an emblem of physical well-being and at the same time of the harmony of the psyche (Barker, 2005).

Some research has shown that participation in musical activities also has positive effects in people's health and well-being (MacDonald, 2013) and the creation of a positive and relational climate also positively affects the motivation to learn (Cottini, 2017).

Music is open to interactions, contaminations and different languages (being itself a symbolic language free from contextual limits), finding ourselves in the era of pluralism. Music teaching acts as a guarantor of freedom, equality and equity in respect of the differences of all and the identity of each one, promoting a condition of general well-being, which invests in particular students with disabilities and with BES.

In line with what is established in the 2030 Agenda, music is a common good, a universal language that connects people and creates generational and cultural cohesion, acting as a glue and as a "bridge" between the individual and the community and, for this reason, access to music should be promoted to minorities and subjects in a situation of economic and socio-cultural disadvantage to avoid cases of early school leaving, emotional alienation and depression (Fancourt & Finn, 2019). Being a form of intelligible language without the need for any translation or mediation, it places itself in an elitist communicative condition, transcending aesthetics and investing ethics, while remaining, in fact, free from education, history and society and, therefore, transversal. As the American ethnomusicologist Alan P. Merriam says, music performs ten primary functions, which relate both to the personal sphere of the individual and to the social sphere of the community, as a symbolic element capable of shortening the distances between the personal ego and what is Other, tuning them to the same frequency, which has much deeper and ancestral origins than a consonance of ideas and values.

Musical thinking can help to recover the ways in which we listen to the living environment and, consequently, the ways in which we produce sounds.

In the study by Cajola, Rizzo and Traversetti (2017) we highlight the possibility, in this regard, to structure interdisciplinary playful-musical laboratories and design them as a space or a didactic strategy that supports the inclusive processes in the class curriculum and the presence of a special

needs teacher-musician contributes, bringing his expertise, to the realization of a sustainable development of the school community, specifically within the class.

As revealed by recent research, the musical activity determines a development of various areas of the person: motor, cognitive, social and adaptive and therefore the executive practice stands as a facilitator of learning, but also as a promoter of social skills and *soft skills*, facilitating communication and emotional expression. It is no coincidence that among the brain areas that are activated during listening to music there are not only auditory areas, but also motor ones (Proverbio, 2019) and that musical training is involved in the processes that slow down cognitive decay and that support people with neuroevolutionary and neurological disorders and this highlights the preventive and sometimes therapeutic function of music, used with patients suffering from various forms of dementia, Parkinson's, autism, as well as an elitist tool in case of specific learning disorders and patients suffering from Williams syndrome, in whom the strong reactivity to music is associated with a spontaneous pro-sociality, a marked talkativeness and an unusual mastery of language (Sacks, 2014).

What's more, listening to music for two to three hours a day in the aftermath of a stroke facilitates the recovery of verbal memory, stimulates the ability to concentrate and improves mood by preventing depression (Särkämö *et al.*, 2016).

According to Dalla Bella *et al.* (2015) these effects of rehabilitation would be due to compensatory brain mechanisms involving the cerebellum-thalamo-cortex circuit.

Since music manages to permeate different aspects of human life, detecting its function as a facilitator, both in the conquest of verbal and paraverbal communication skills, and in the cognitive sphere, it is an inclusive medium and promoter of well-being, useful above all in a didactics of laboratory imprint.

The democratic component of music allows each student to take part in it according to their personal possibilities; it also leaves room for self-expression, which connotes artistic activity, supporting motivation for learning, personal exposure and socialization. The learning of the musical language also promotes the learning process understood in a global sense, facilitating a functional development in accordance with the principles of health and well-being (Fontana, 2020). In particular, the process of learning musical skills allows to exercise and enhance cognitive, emotional, social and relational skills and competences of all students. These skills, learned in the course of musical workshops, can be transferred beyond the school walls, in everyday life, in a chain reaction of improving processes also in

spatial and motor skills. Creating ensemble music workshops, in which the teacher assumes the role of "director" promotes the acquisition of musical skills, but also prosocial, relational and emotional. To play together it is necessary to listen to each other, be in tune, follow the rhythm and adapt one's own to that of others, to be all at the same time and produce a fluid and harmonious syntax. In this setting the anxieties are amortized and the weight of the error is felt in a less oppressive way and therefore increases the perception of well-being and self-confidence and the perception of self-efficacy, which are, in fact, the objectives that the educational action aims. Playing together in the orchestra or in musical workshops in the school environment, allows children to grow while having fun and developing skills, feeling an active and significant part of a group, offering opportunities for maturation in a plurality of dimensions.

In addition, the possibility of learning to play an instrument and establishing a significant bond with it, which becomes an alter-ego, an extension of the personality, takes on very interesting connotations about self-expression: one has the possibility of communicating one's emotional experience to others, through a non-verbal code, but one can also sublimate negative emotions, a sort of instrument-mediated catharsis.

Taking up a quote from E.T. Hoffmann, he wrote about instrumental music "it is the most romantic of all the arts: one could even say the only romantic art", precisely because it is an intangible art capable of expressing melancholy, burning passions and walks through the paths of interiority, sublimating them.

Emotions and moods, common to all cultures, as demonstrated in a study by Paul Ekman in 1971, which is why, listening to one of Chopin's twenty-one *Nocturnes*, one is overwhelmed by a universal and sensitive poetry, regardless of one's geographical location.

According to this principle, schools in which the use of a multicultural repertoire, known to all and close to the experiences of the students and the use of composition to convey shared emotions and meanings, has been envisaged, has resulted in a greater level of inclusion and affective attunement and therefore a condition of psycho-social well-being.

In recent times and especially in the last two years, harassed by the Covid-19 health emergency, adolescents have manifested a psychological discomfort that has conditioned their existence and social relationships with the peer group and has strongly impacted on communication, cooperative and socio-emotional skills. For this reason, it is even more urgent to promote an inclusive and generative dimension of welfare (Fancourt & Finn, 2019) in an ethically and aesthetically usable multimodal experience to rediscover the pleasure and usefulness of playing together.

The pandemic, however, has also accelerated a process of technological transition in educational institutions, forcing the school world to interact with innovative teaching strategies and novel devices in order to continue to guarantee the right to education, armed with digital (not always adequate) and psycho-pedagogical skills.

Although this parenthesis seems to have come to an end, returning to a purely traditional didactics would be anachronistic and countercurrent. In fact, various doors have been opened to different frameworks of learning, especially with regard to the gamification of learning through the use of serious games, which Gunter, Kenny and Vick describe as games that set educational objectives with a fun background.

Serious games and game-based learning contribute to a variety of learning outcomes (Behnamnia *et al.*, 2020; Sailer & Homner, 2020; van Gaalen *et al.*, 2021), most of which are cognitive in nature, especially in children with frailty, who require support from the special needs teacher-musician. Precisely for these children, the syncretism of music, play and technology could prove to be very fruitful and enable an improvement in deficits.

4. Serious game and rhythm training

The special needs teacher-musician succeeds in combining disciplinary skills with psycho-pedagogical skills and would be a valuable tool in the service of didactics and the most fragile students in the school environment.

Training and informing special needs teachers-musicians of the potential of music on neural plasticity and its consequences would be a resource for the school institution, but it would also be a real asset for individuals with disabilities, specific learning disorders and neurodevelopment disorders (es. dyslexia or ADHD). Setting up music workshops in each school could bridge the gaps in the inclusion process and thus in achieving well-being at school.

Current trends bring together therapeutic and rehabilitation value with the digital transition that has affected not only our society, but also educational programming.

Indeed, incorporating ICT in the school environment has proven to be a real possibility for promoting inclusion, autonomy and motivation.

Technology has pervaded many spheres, not even leaving behind the arts (often eclipsed) and leading to the creation of serious games centred

on the music-therapeutic potential of music training and, in particular, rhythm training that takes place in a fun, playful but educational way. Interestingly, the ability to track rhythm has been associated with other cognitive abilities such as working memory, sustained attention or language and reading skills in children (Tierney & Kraus, 2013; Woodruff Carr *et al.*, 2014).

5. Special education transition

Current trends bring together therapeutic and rehabilitation value with the digital transition that has affected not only our society, but also educational programming. With today's rapid developments in technology, mobile devices, including the iPad and related software applications, are gaining popularity as an educational tool.

Has been found Rhythmic deficits are associated with poor performance in language, attention and working memory tasks. The retraining of rhythmic skills may therefore provide a promising avenue for improving these associated cognitive functions (Begel *et al.*, 2018). Reflections on the implications of such educational tools on students with ADHD and DSA appear spontaneously, even though the educational terrain is still rather immature in this regard (Goh *et al.*, 2021). Since rhythm training appears to cause improvements in several areas not exclusively related to musical performance skills, devising and testing a new rhythm training protocol, implemented as a serious game exploiting new mobile technologies in the school environment, could open up several scenarios for educational intervention.

Serious games can involve the use of commonly used mobile devices, but also have visors or consoles to play in virtual reality (VR) to make the experience even more immersive and the game even more engaging.

Two very interesting and multi-sensory 3-D serious games were developed using state-of-the-art VR: Rhythm Workers and ADDventurous Rhythmical Planet.

In virtual reality (VR) of ADDventurous Rhythmical Planet, players use a drum to create a rhythm, which is then transformed into a game action visually represented in VR space. In the game, the protagonist is an alien who can only continue his journey with increasing difficulty if the player correctly plays a rhythm. The levels become increasingly difficult and can be played either in single player or multiplayer mode. The game's storyline encourages children to play with each other and to switch from single to multiplayer mode. When playing in multiplayer mode, the

rhythm is created together, all players collaborating in playing the correct rhythm. This game requires VR headsets, a drum module capable of transmitting information to the VR system, and computer systems capable of running the VR system. Children, students are encouraged to create music in order to overcome the mission and receive an immediate reward, provided by the game's narrative.

Rhythm Workers is a serious game that has two modes and the game objective to be achieved is to construct a building.

When the musician accurately beats the rhythm (tapping version) or correctly detects whether the percussion sounds are aligned with the rhythm (perception version) the building components appear better structured (e.g. more symmetrical), richer and more aesthetically appealing than when the player's performance is not good.

In the proof-of-concept pilot study by Bégel *et al.* (2018), high participant motivation during the game was found to be maintained throughout the two-week training protocol. This finding is very encouraging because the players' motivation attests to the fact that the game is engaging and thus stimulates users to achieve satisfactory scores and thus to achieve positive rhythmic skills.

The interest of policy and educational institutions could provide an incentive for researchers to want to develop the game using less expensive and more readily available equipment (Davis-Temple *et al.*, 2021).

6. Conclusions

Strengthening the interaction between technology, music and education provides an opportunity to concretely help pupils with special educational needs, as the results produced using serious games in environments away from school are encouraging and deserve more attention and experimentation in the familiarity of the school context. In the light of the promising results of the recent research, it is plausible to hope for a future in which didactics, music and technology are intertwined, providing school professionals with significant expertise capable of addressing the special educational needs of pupils from an inclusive perspective, where making class means making community and music is no longer a niche art or a sideline discipline, but a real resource for personal and cognitive growth, connecting all the actors involved.

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Riassunto

Questo contributo intende offrire spunti di riflessione sul ruolo ancestrale della musica per l'uomo, considerando le sue potenzialità, trasversali a diverse aree di interesse, tra cui quelle psicopedagogiche, cliniche e didattiche, in quanto espressione eterogenea di culture, comunità e caratteri. Nonostante l'obbligatorietà dell'educazione musicale nelle

scuole secondarie di primo grado, non in tutti i contesti le attività sono strutturate e svolte tenendo conto delle implicazioni positive sul benessere psico-fisico degli alunni, sulle potenzialità riabilitative e sull'aumento della loro motivazione all'apprendimento. Così come sono molteplici le possibilità di dinamiche e tempi in musica, altrettanto ampio è l'orizzonte di opzioni che si staglia lungo il cielo dell'azione didattica, intersecando anche il mondo della tecnologia, che mette al servizio dell'istruzione strumenti innovativi quali i serious game.

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