

THE RELATIONSHIP BETWEEN MUSIC AND MATHEMATICS

Jessica Lanzo
Istituto Comprensivo
"Scopelliti-Green"
Rosarno, ITALY

Nadia Scarfò
Istituto Comprensivo
"Scopelliti-Green"
Rosarno, ITALY

ABSTRACT

The training active (TFA), is a preparation for teaching, which lasts one year, set up by the Italian Ministry of Education to obtain the qualification for teaching in the lower and higher secondary school. The authors, the first one as a tutor and the second one as a trainee, report here the didactic activity held in the Comprehensive Institute of Rosarno in Italy. The comprehensive school "Scopelliti - Green" has a few courses specialized in music. As part of the training provided by the direct TFA to teach of Mathematics and Science, the trainers subject pupils to a class specialized in music, a questionnaire on the usefulness and importance of the study of music in education and training of students. The survey, qualitative, was performed in a course in special musical class composed of 34 students of which 32 are attending. For many years, experts in pedagogy have shown the importance of music in the education of young people, and especially the study of a musical instrument, allowing a harmonious physical and mental development, it helps to improve relations between peers, it enhances their intelligence and it develops creativity. The frequency of the music course promotes many opportunities to exchange, to meet and to participate in musical events that broadens the horizon training of pupils and their wealth of experience, encouraging healthy growth, both cultural and social, and a significant overall cure in terms of artistic, human and intellectual.

Keywords: TFA, Music, Mathematics, Education.

INTRODUCTION

The traineeship, (TFA) [1], has the target to allow the trainee to be directly in contact with the world of school before having the qualification. Therefore, it is an activity of orientation and training conducted in an Italian school, which allows knowing how work is conducted. An educational opportunity in which you can experience the teaching methods needed for the teaching profession. At the same time, you can learn the school's organization, its functioning, and the relationship between the different figures that operate within it.

The music, the universal and fundamental component of human experience, offers a symbolic space and relational conducive to the activation of processes of cooperation and socialization, the acquisition of knowledge tools, the promotion of creativity and participation, development of a sense of belonging to a community, and the interaction between different cultures. Learning music performs specific functions formative, interdependent.[2] Through the cognitive-cultural function, the students practice the ability of symbolic representation of reality; develop a flexible thinking, intuitive and creative.

Using the function linguistic and communicative music educates pupil's expression and communication through the tools and techniques specific to your language. Using the function emotional-affective, pupils, in relation to the work of art, develop reflection on symbolic formalization of emotions. By identity and intercultural function, music leads pupils to become aware of their belonging to a cultural tradition and at the same

time providing them with the tools for understanding, comparing and respect of other cultural and religious traditions. By the relational function it establishes relationships and group, based on practices and listening compartecipate shared. Using function-critical aesthetic it develops in the students an artistic sensibility is based on the interpretation of sound messages is art, elevates their independence of judgment and the level of aesthetic appreciation of the cultural heritage.

As a means of expression and communication, music constantly interacts with other arts and it is open to exchange and interactions with various fields of knowledge. Aristotle, in the *Metaphysics*, wrote: "The numbers do not exist in itself, Exist because they are found in musical scales, In the sky, and in many other related things". For thousands years it is known that between music and mathematics there is a strong affinity. Pythagorean and Platonic philosophy flourished on a tight weave between music, mathematics and astronomy. The relationship between music and mathematics are very tight, both at the elementary levels that more complex. These relationships are easy to understand even for a layman, for example for the durations of the sounds (double or half, quarter, and so on). The music stops in the memory for its mechanical and physical data. The rate is the number, is accurate measurement of time. Music is the meeting point par excellence between the arts and the sciences and mathematics in this meeting plays an essential and central. Continuing to talk about the link between music and mathematics, we can quote the great composer and music theorist of the eighteenth century French Philippe Rameau, who wrote in his "Traité de l'Harmonie reduite à ses principes Natureles" (1722) "music is a science It must have certain rules: they must be removed by a clear principle and that principle cannot be known without the help of mathematics. I must admit that despite all the experience I have acquired in the music for having practiced during a long enough period, however, only with the help of mathematics that my ideas are unraveled and that light is the successor to a certain darkness which I had never noticed before. ". [3]

Pythagoras generally considered the founder of the first school of mathematics as a purely deductive science, as well as being one of the most important mathematicians; he was a composer and music theorist. It was a musical intuition which enabled Pythagoras to formulate the link between mathematics and nature, which is probably the most profound discovery and fruitful history of the entire human thought.

According to the Iambic,[4] the episode is as follows. One day Pythagoras passed in front of the workshop of a blacksmith, and he realized that the sound of hammers on anvils was sometimes consonant, and sometimes dissonant. Intrigued, he entered the workshop, you did show the hammers, and found that those who rang in consonance had a specific weight ratio. For example, if one of the hammers weighed twice of the other, they produced distant sounds an octave. If one of the hammers weighed one and a half the other, they produced distant sounds a fifth (the interval between the Do and Sol). Back home, Pythagoras did some experiments with nerve ox live, to see if any similar rule was worth to the sounds generated by string instruments, such as the lira. Surprisingly, the rule was even the same, for example, if one of the cords had double length of the other, they produced distant sounds an octave. If one of the strings was long one and half the other, they produced sounds a distant fifth.

Because the laws of harmony discovered by Pythagoras intervened only fractional numbers, also called rational numbers, and the harmonic ratios perfectly matched to the numerical relationships, Pythagoras enunciated his discovery in the famous maxim: "Everything is (number) rational". To him, then, we have the discovery of the wonderful correspondence

between musical intervals and numbers, a report that is still the basis of the general theory of musical harmony. In conclusion, science and technology they have now surpassed all geographical boundaries and permeated the entire globe, just as they are based on the coincidence between nature and mathematics that Pythagoras had first been able to intuit and pursue.[5]

RESULTS AND DISCUSSION

The questionnaire is anonymous, with open-ended questions formulated according to the following indicators:

1. personal growth;
2. interpersonal relationships;
3. expression of emotions;
4. personal choice;
5. relationship with mathematics.

Below there is an analysis of the responses of the students.

Question number 1 "Do you think that the study of music is an opportunity for personal growth and why"

All students answered positively, providing more as motivation that music can enrich themselves, to know new "things", to express their emotions, (anticipating the answer to Question 4), to be less shy, of to prepare to possible future career. Below some of the answers considered more significant.

"My music can give life to those who could had lost hope ... the music is everything." "... with it are expressed with simple words that cannot be defined and helps you to gain self-esteem and responsibility" "... through it I realized how rise after taking a bad grade, or how to cross the difficult times of my youth, but not only, many times it helps me to vent anger. Today I thank the music for what it gave me".

Question number 2 "Do you think that studying music and playing in a group with other students can improve your relationships? Also lists your experience."

Not everyone has given an affirmative answer to this question, in fact, according to a small number of students, playing in a group can be an occasion of envy and competition. Most of them believe instead that improve interpersonal relationships because it helps to overcome shyness and make new friends, and promotes the integration of young misfits. In addition, having to meet deadlines and rules regarding the operation of an orchestra, you can acquire skills such as to know how to listen to the other and thus be able to adapt.

They write some fact:

"... Playing in group I learned to stay in contact with older students or to other classes." "It could not only improve relations, but also the running, as you can compare." "Through music I became more friendly ... Playing in an orchestra is perhaps one of the most beautiful music."

Question number 3 "Why did you choose the musical direction?"

All pupils say they have freely chosen to attend the music because attracted by the idea of learning to play an instrument, not conditioned by the desire of parents and thinking about a

future career in sector. Another added value of the course is that it offers the opportunity to study music to those who do not have the financial ability to do it privately. "As a child I always dreamed to study an instrument ... And an experience that I never had the chance to do."

Question number 4 "The music allows you to express emotions that you could not express otherwise?"

All pupils respond that music is emotion and that allows them to communicate whatever they feel, like a language through which to express feelings and emotions, both positive and negative. In particular by a response it emerges the importance of the communicative as it allows arousing beautiful emotions in the listener. "... To be able, to be happy, to see that someone liked the music I played." "With music I can make people understand if they are sad or happy."

"When I am angry outburst playing."

"When you are angry you will immediately understand the way in which to play"

"It also serves to forget problems."

"Without music I could never be myself."

"While I sound free from some disturbance."

Question number 5 "In your opinion, what mathematical knowledge help you for the study of music?"

The answers crystallize a full awareness of the importance of mathematics in the study of music in octaves, over time, the value of the notes, in bars.

A student, however, writes that mathematics is only in the initial phase of the study of music, as switching to a higher level, the mechanisms related to rhythm and structure are internalized and it is played only with the heart. "A little 'knowledge of mathematics, but after no longer served ... All music comes from the heart"

CONCLUSIONS

The decision to conduct an inquiry in the classroom about on the music and its relationship with mathematics, it found teachers agree, especially students, agree who were able to give free rein to their imagination and their opinions. What has emerged it is surprising, especially in reference to the knowledge that the children of that age group have on the relationship between music and mathematics and how music can help in learning of mathematics as it allows you to develop skills about reason and stimulate creativity.

Most students love music; He emphasizes the word "love" they used to express this passion; the music is also often seen as "panacea of all evils", as a means to be happy and make happy. So the music and making music is a powerful medium to form the pupil and the future city, which is the main purpose of the school today. Thanks to it they grow, they are confronted, they acquire social skills and cognitive. In a fragile territory, characterized by many problems as Rosarno, to make music at school it is an important opportunity for the boys, who can learn and have fun at the same time in a healthy community by social values.

ACKNOWLEDGEMENTS

The authors thank Dr. Eburnea Giuseppe (Italy), head teacher of the Istituto Comprensivo “Scopelliti-Green” of Rosarno (Italy) for their help. This work was supported by the Istituto Comprensivo “Scopelliti-Green” of Rosarno (Italy).

REFERENCES

1. Miur, 2010, D.M. n.249/2010, Regolamento concernente: “Definizione della disciplina dei requisiti e delle modalità della formazione iniziale degli insegnanti della scuola dell’infanzia, della scuola primaria e della scuola secondaria di primo e secondo grado, ai sensi dell’art. 2, comma 416 della legge 24 dicembre 2007, n. 244.
2. <http://iflautistidiscanzanojonico.jimdo.com/> “Perché studiare musica”
3. http://it.wikipedia.org/wiki/Rapporto_tra_musica_e_matematica
4. Giambico, Sito web. www.extramuseum.it
5. http://math.unipa.it/~grim/TesiFP_ragusa_04.pdf