

"Musimath": Creative thinking via Music, Math and Technology in elementary school

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The relation between music and mathematics has been recognized since the times of Pythagoras, Plato and Aristotle, who wrote about the overlaps and links between the two disciplines (Bamberger & Disessa, 2003). The two disciplines are similarly expressed through the use of representational language and symbolic notations. One of the applications for multidisciplinary education (STEAM education) is emerging as a new pedagogy that aims to increase students' interest and skill in the fields of science, technology, engineering, arts and mathematics (Allina, 2013; Quigley, Herro, & Jamil, 2017). Multidisciplinary education that promotes creativity enables different students to learn in a diverse way and improve their learning skills. The proposed study examines learning connecting music and math disciplines in elementary school in third grade and its impact on students' creative thinking by using computerized tests.

Studies that have included explicit links between conceptual knowledge and the processes inherent in music and mathematics have indicated positive transference effects between disciplines and improved learners' academic abilities in the areas of patterns, symmetry and fractions (Azaryahu et al., 2019; Azaryahu & Adi-japha, 2020). The present study examines the effectiveness of learning mathematical basics in music using explicit instruction and its impact on the creative thinking of learners in both fields. For the purpose of the study, an original intervention program, "Musimath", was developed, in which patterns were studied in music and math lessons with emphasis on creative thinking (Guilford, 1973; Torrance, 1969). The study used a mixed method while the mathematical knowledge, the musical knowledge and components of the students' creativity in both disciplines were tested using writing assignments and separate computerized tests.

In order to collect the data, we developed software that allowed the students to perform musical and mathematical tasks. The closed tests required them to type a melody, rhythm, pattern, or mathematical form precisely, while the open tests required them to respond freely and creatively. In the closed musical test, for instance, the subjects were asked to type an exact sequence of five notes on a piano keyboard, and in the open test, they were asked to complete a new sequence with four notes of their choice. Similarly, in a closed question in the mathematical tests, four images of ducks appeared, and the subjects were instructed to click on the picture in which the ducks were obtained by sliding, whereas in an open question, they were asked to freely draw some examples of symmetry in sliding. Behind the scenes, the software collected the subjects' responses and saved them in an Excel file or as JPG pictures that provide evidence of their responses.

The study is being conducted these days. Detailed results comparing the mathematical and musical creative thinking and the interaction between them will be presented in the conference.

References

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