

Chapter 29

The Coding Maestros Project: Blending STEAM and Non-STEAM Subjects Through Computational Thinking

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ABSTRACT

The Coding Maestros project is the result of music and dance meeting coding through the application of computational thinking in an informal, cross-grade, student-led K12 context. The underlying research goal was for the authors mentoring this inter-disciplinary STEAM initiative to build a shared framework in order to experiment with the application of computational thinking in a series of guided discovery learning sessions and, for the students to develop a deeper understanding of, and benefit from holistic, inquiry-based learning, apply logical, critical and creative thinking to further develop their problem-solving skills outside the boundaries and expectations of formal learning, through trans-disciplinary collaboration. The framework, process, and outcomes are presented in this chapter. The culminating presentations/performances demonstrated that ACS Athens students enjoyed remarkable learning experiences that attracted and sustained their attention, developed their problem-solving skills, and sparked their curiosity to pursue deeper learning in any of the STEAM-related fields.

INTRODUCTION

The Coding Maestros project is the result of music and dance meeting coding through the application of computational thinking in an informal, cross-grade, student-led context. Owing its conception to the annual Literacy Festival of the American Community Schools (ACS) Athens and its implementation to the school's full support of classroom innovation— a large K12 International School in Athens Greece-, the project recruited 17 student volunteers representing Grades 1 through 9. With the mentoring of the

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Elementary School Music Teacher and the Director of Educational Technology (authors), students created, and led four well-attended and enthusiastically received performances first at the school Literacy festival (2018), and a year later at the Athens Re-Science Festival (2019).

Grounded on the components of inquiry-based, independent, and flexible learning of the i²Flex/blended methodology, (Avgerinou & Gialamas, 2016; Avgerinou 2021), and Masie's notion of *blendedness* (2006)— all learning defined as blended-, the project goal was to arrive through the informal application of computational thinking, at a continuum of learner-led, authentic educational activities of progressive difficulty. These activities emerged from an innovative blend of student-performed music and coding with the support of an augmented reality software, as well as live instrumental and dance performances (Avgerinou & Apostolou, 2019). The underlying research goal was twofold: (a) for the authors mentoring this inter-disciplinary STEAM initiative to understand each other's perspective and build a shared framework in order to experiment with the application of computational thinking in a series of guided discovery learning sessions; and, (b) for the students to develop a deeper understanding of, and benefit from holistic, inquiry-based learning, while applying logical, critical and creative thinking to further develop their problem-solving skills outside the boundaries and expectations of formal learning, through cross-grade, trans-disciplinary collaboration.

The culminating presentations/performances demonstrated how through those holistic, inspirational and innovative educational activities that engage STEAM and non-STEAM subjects, ACS Athens students enjoyed remarkable learning experiences that attracted and sustained their attention, developed their problem-solving skills, and sparked their curiosity to pursue deeper learning in any of the STEAM related fields of their selection.

THEORETICAL FRAMEWORK

Multi-Literacies

According to UNESCO (2006) in the 21st century “literacy as a concept has proved to be both complex and dynamic, continuing to be interpreted and defined in a multiplicity of ways” (p. 1). In order to meet the demands of the information society and be successful as a future employee and citizen in a constantly and rapidly changing world, today's learners are prepared to graduate school with a redesigned set of character qualities, competencies and skills. As a result, the very concept of literacy itself has been reconsidered and transformed into multi-literacy (World Forum, 2016) --both in terms of content, and of the modes and media involved (Kress, 2003; 2009); - and even ‘pluriliteracies (Cinganotto & Cuccurullo, 2019).

The new term encompasses different types of literacies and modalities from foundational and scientific, to civic and ICT/coding. All of them are important, but a few are perceived as the essential ones: Digital Literacy, Media Literacy, Visual Literacy, Data Literacy, Game Literacy, Health & Financial Literacy, Civic & Ethical Literacy, News Literacy, Foundational Literacy, Coding & Computational Literacy (Pietila, 2017). The aforementioned literacies, regardless whether they are familiar or completely new, are not only interrelated but also perfectly aligned with the learner profile that contemporary education systems across the globe, aim to create. Toward that goal, various pedagogical frameworks have been proposed, with the most popular being the ‘Learning by Design’ model by Cope and Kalantzis (2009; 2016). As a result, as Papadopoulou & Avgerinou (2019) indicate, students' multiliteracy/multimodality

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