Chapter 19
The Smart "Mitato":
A Holistic Approach to Creative Development Through Educational Robotics

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ABSTRACT

The chapter is an attempt to structure the lesson in a holistic way with the use and application of educational robotics. Emphasis is given on developing students' creativity, which is one of the dominant challenges of modern educational system, as it can be achieved through an educational environment focused on it. The use of STEAM method can help students develop creativity and at the same time develop skills such as programming and using new technologies (ICT). In fact, robotic constructions can help students understand basic principles of science such as mechanics and mathematics while solving problems related to their daily lives. During the project, students work in groups and highlight their skills in areas such as the creation of a mock up, the construction and presentation of robots, etc. This process gives the course a manifold holistic approach, as the knowledge the student acquires from different domains is used towards one direction, instead of the classical approach according to which only one subject is analyzed.

INTRODUCTION

The main aim of this chapter is to present a project which was carried out among the students of the 6th class of Primary school and to analyze the steps that were followed by the teachers during its implementation, the difficulties they encountered and how they dealt with them. The presentation does not aim at recommending this project as a model lesson to other classes but at demonstrating a different educational approach, adapted to students.

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The project during its implementation makes use of educational robotics, without analyzing the coding mechanisms and methods, which come, however, as a result of the lesson. It also includes an analysis of how students' multiple skills are exploited and how they work in groups. Every teacher, being aware of the special conditions of his class and the individual skills of his/her students, can adapt the project to his/her own measures. Moreover, the topic of the project derived from the different characteristics of the geographical area the students live, in order to motivate them. The use of this project method in other classes will depend on the appropriate selection of the topic and not on the use of the project itself.

Finally, the steps and duration of the project depended, to a large extent, on the students' willingness to enrich the project and engage in it for a long time. Many parts of the project may be omitted if the teachers feel that their students do not show much interest, while at the same time they may emphasize other parts, more appealing to the students. As a result, in such a project each teacher may target at different subjects. Based on his/her own goals the educator adapts the project to the needs of his/her class. A successful project is the one that achieves the goals that were initially set (perhaps some of them may come up during the implementation of the project) and provides knowledge to the students in a fun way. It is the students' satisfaction and sense of willingness and fulfillment that serves as a driving force and encourages the teacher to continue using educational robotics as an educational tool in his/her classroom.

In order to find out whether students can develop their creativity through their involvement with educational robotics, 84 students, aged 10 to 12 years old, 4 teachers and 2 IT educators, from four different Greek Public Primary Schools in Crete, participated in the present study. The research was carried out in the form of semi-structured interviews in order to shed light in points related to the development of creativity, which need further clarification. The goal is also to examine the correlation between the development of students' creativity and educational robotics, as they are considered to be two major research aspects in modern education.

CREATIVITY DEVELOPMENT

Can creativity be enhanced? This is one of the core and substantive questions nowadays. The difficulty in defining and studying the term creativity is undoubtedly great, yet scientists tend to agree that creativity can be taught (Amabile, 1996; Baer & Kaufman, 2006; Craft, 2001; Cropley, 1992; Esquivel, 1995; Fryer, 1996; James, Lederman, & Vagt- Traore, 2004; Kaufman & Beghetto, 2009; Parnes, 1963; Puccio & Gonzalez, 2004; Runco & Chand, 1995; Torrance, 1963; Wilson, 2005). Guilford (1950) argued that "*Like most behaviors, creativity is likely to represent to a great extent some acquired skills. There may be limitations to developing these skills, but I am convinced that through learning they can be expanded within these limitations.*"

The concept of creativity, although it is particularly valuable for humans in order for them to be able to survive and thrive (Hennessey & Amabile, 2010; Puccio, 2017), has only been studied deeply and consistently in the last decades. Initial efforts focused on the definition of the concept, while the interest has gradually shifted to its measurement and in recent years to the ways in which the results have been used at all levels of education (Kim, Cramond, & Bandalos, 2006).

The number of researches in recent years has contributed to a significant progress, not only because of the aforementioned results, but also due to the correlation of research with the social and economic well-being of creative people and the wider opportunities on the labor market (Chan & Yuen, 2014; Davies et al., 2013; Scott, Leritz, & Mumford, 2004; Wells & Claxton, 2002). Accordingly, many de-

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